BBC MICRO·MASTER·ELECTRON·ATOM

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ACORNUSER

MARCH 1986

DISC EDITOR:
Software to save programs by

TUNEMAKER:
Score with our type-in composer

SAVE MEMORY:
Bigger programs with sideways RAM

ADVENTURES:
Stimulation from simulation



PIXEL POWER:
Sharpen up your pictures

THE BBC MASTER

Better value than any other micro, says Bruce Smith

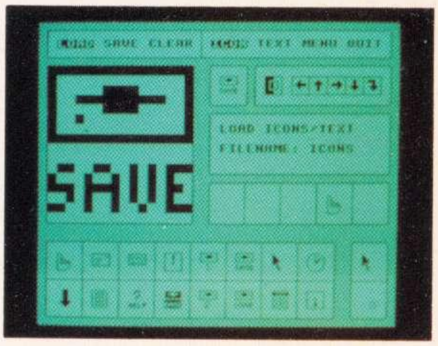


BEEBUG SOFT

ICON MASTER — Icon Control System

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This pack automates the creation of an icon-driven user interface. It is supplied on a 16K Rom and allows you to design a screen containing icons and then use it in your own programs, in place of a normal menu.



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Your own icon-driven programs may be used with or without the Icon Master Rom in your machine.

ROMIT — Put your own Basic programs into Rom

CREATE YOUR OWN SILICON DISC

RomIt is a 16K Rom which adds a new feature to your BBC Micro — A Ram Filing System. This provides over 20 new commands which enable you to:



1. Create a silicon disc with its own filing system commands. Type ★RAM, then you can catalogue the "disc", save and load files to it, storing as many files as memory will allow. You will need sideways Ram to use this facility.

2. Put your own Basic or assembler programs (or any file) into Ram and then make them into Eproms. Whether it's your favourite game, your function key definitions or any program that you use frequently, you can now put it into Eprom so that it's always instantly available.

Your Eproms will work with or without the RomIt chip in your machine, and so you may pass on copies of your programs to other people.

Getting your own Basic program into Rom couldn't be simpler. Just load your program into memory and type: **★RAM ★TRANSFER "prog" ★DOWNLOAD** and either connect it to a blower, or send the disc (or tape) to us, together with your RomIt registration number, and we will Rom it for you. (There is a small charge for this service).

3. Use your sideways Ram as a printer buffer so that you can continue to use your computer for other work at the same time as printing long documents.

Over 20 new ★commands are provided by RomIt

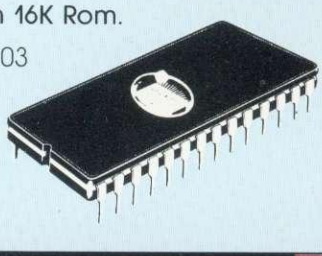
To get the most from RomIt you will need sideways Ram fitted to your computer, eg just a single Ram chip plugged into your ATPL (or other) Rom board.

ICONMASTER £34.00 ROMIT £34.00 inc. VAT

Available from your local dealer. **Supplied on 16K Rom.**

For further information: Tel St. Albans (0727) 40303

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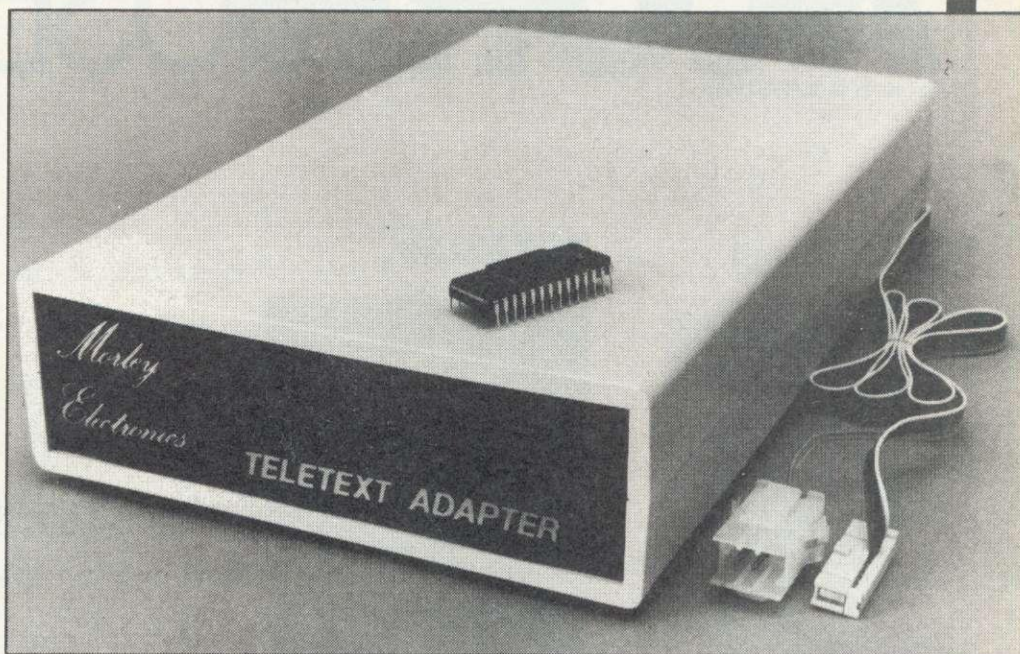


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BEEBUGSOFT

MORLEY ELECTRONICS





FEATURES

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- Software available on ROM or sideways RAM format disc.
- Basic 1 & OS1.0 compatible.
- Gives you a real-time clock at your disposal (*TIME).
- Free software upgrades to allow for any enhancements to the teletext service. Eg: extra channels, full field data on cable & satellite systems etc.
- Easy to follow comprehensive user guide.
- No hardware limitations, it can for example receive virtually unlimited numbers of channels.
- Works with Solidisc SWR.
- Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).

ELECTRON TELETEXT ADAPTER
Electron adapter now available, including emulated Mode 7 allowing you to run long Adventure type programs.

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Easily the best value Mode 7 screen designer on the market today.
Design any mode 7 screen, from simple MENU pages to full CEEFAX standard. This program is an invaluable aid. Designs can be saved to disc as automaticaly numbered files or the program will convert the screen into a BASIC Proc.

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The Morley Teletext adapter introduces you to the world of Teletext at a price that wont break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than eight years ago, will be fully compatible with any future advances in the Teletext system.
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ISSUE No 44 MARCH 1986

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FEATURES

MASTER WORK



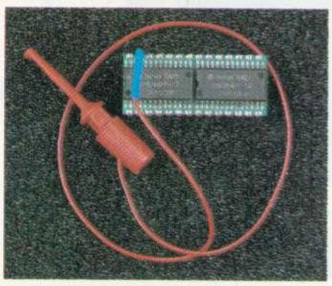
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Bruce Smith conducts a revealing in-depth examination of the micro at the heart of Acorn's new series – the Master 128 – and looks at its first upgrade board, the Turbo co-processor

LISTEN TO THE MUSIC



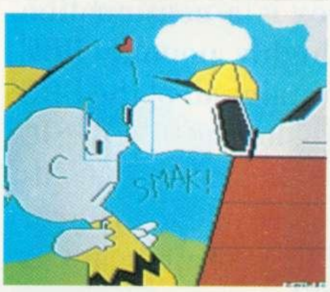
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A must for anyone learning music – or use it just for fun. Colin Atkins' *Tunemaker* program allows you to enter music on an on-screen stave and hear it played back

SIDEWAYS STORAGE



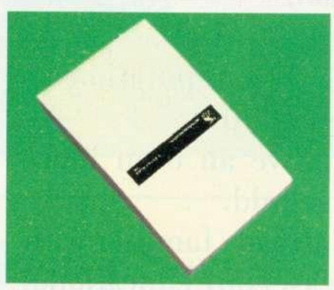
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THE LAST DETAIL



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6502 SPECIAL



91
Extend the powerful HiBasic assembler in the 6502 second processor with Martin Chaplin's listings – plus you can also learn about the Master's new assembler instructions

COVER



Cover photograph by Phil Jude

NEXT MONTH

BUSINESS SPECIAL

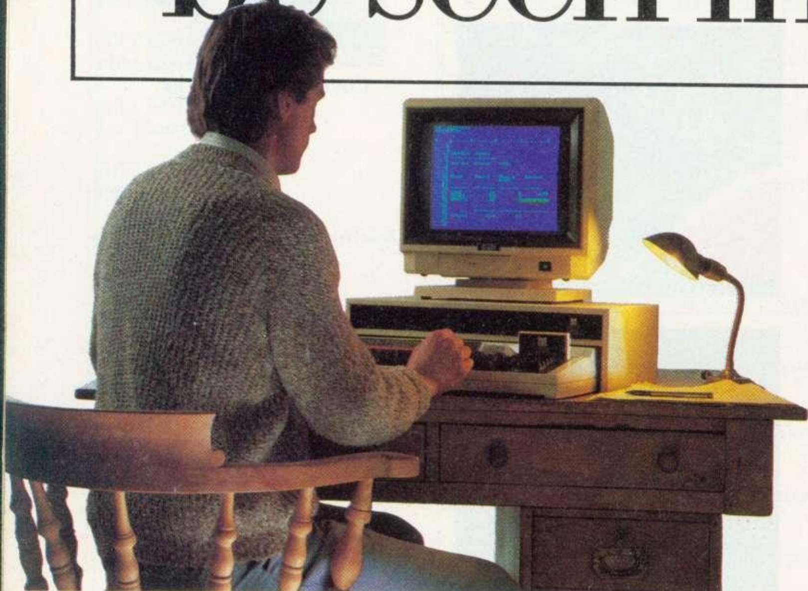
Your guide to the options available for BBC users

Our hints and tips for April Fool tricks you can play

Joe Telford presents an electronic book for children

How to extend Basic from disc and sideways RAM

The new BBC microcomputer series will be seen in all areas.



The BBC Master Series is a continuation and development of the highly popular BBC Micro. As such, the series retains all of the BBC Micro's traditional virtues including BBC BASIC and a superior choice of software and peripherals.

Though never before has one microcomputer encompassed such a wide range of applications or offered so much potential.

<u>THE HOME.</u>

BBC Micros have gained a reputation as powerful, versatile home computers.

The Master 128 will prove an even more useful addition to the household.

Your child is probably already familiar with it from school. In which case, our educational programs will ensure that learning continues at home.

By using a Teletext adaptor, up-to-the-minute information can be called up instantly.

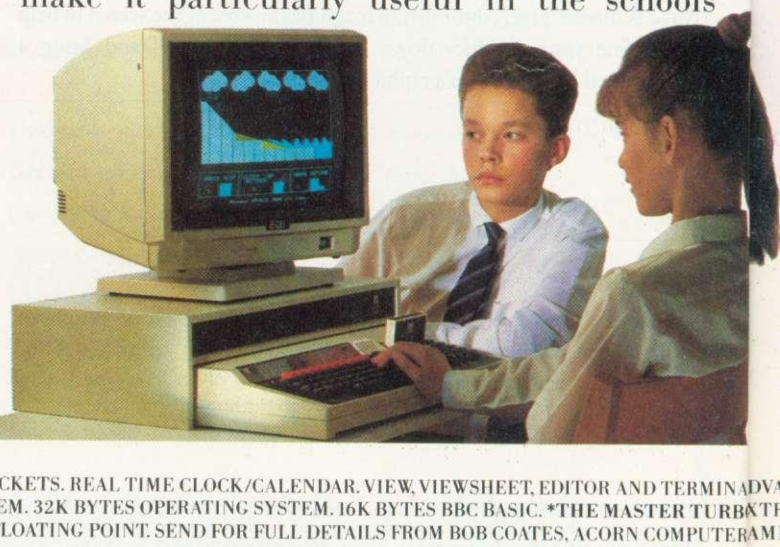
And via a Modem, you can control all the money in your bank account, paying bills and standing orders from the comfort of your own home. You can even write and send letters on screen by Electronic Mail.

Yet despite these advances, the price remains the same at £499 inc. VAT.

To speed up other tasks, there is the Master TURBO. For an extra £125 inc. VAT, it improves the Master 128's benchmark from 9.2 seconds to a record-breaking 4.67 seconds using BBC BASIC.

<u>THE SCHOOL.</u>

The BBC Micro is already to be seen in 75% of our schools. New features on the Master 128 make it particularly useful in the schools



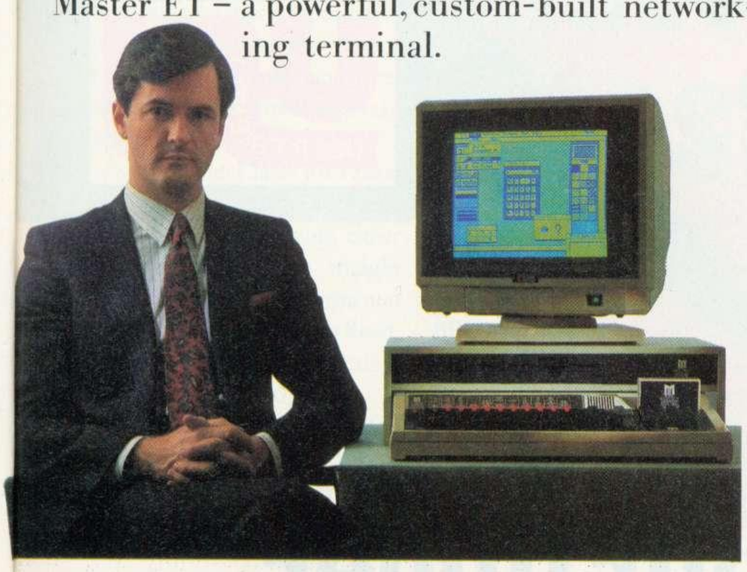
THE MASTER 128. 128K RAM 2 x 256K ROM CAPACITY CARTRIDGE SOCKETS. REAL TIME CLOCK/CALENDAR. VIEW, VIEWSHEET, EDITOR AND TERMIN
THE MASTER ET. 128K RAM AND 64K ROM. ADVANCED NETWORK FILING SYSTEM. 32K BYTES OPERATING SYSTEM. 16K BYTES BBC BASIC. *THE MASTER TURB
RAM. HARDWARE FLOATING POINT. SEND FOR FULL DETAILS FROM BOB COATES, ACORN COMPUTER

area. The word processing package makes it ideal for creative writing.

While its sophisticated spreadsheet will prove invaluable in any Maths Class.

As an upgrade of the 128, the Master 512 gives higher levels of education access to MS-DOS compatible applications. For under £500.

Or for only £348.26 exc.VAT you have the Master ET – a powerful, custom-built networking terminal.



Our ECONET networking facility is probably the world's best selling, low cost network.

Combined with the Master ET, it affords considerable cost saving without limiting your expansion options, ensuring the BBC Micro's place throughout our education system.

PROFESSIONAL.

Business dictates that a microcomputer is both efficient and easy to operate.

The Master 512 puts all the power of 16-bit computing under your control, for under £1,000.

This control comes courtesy of the GEM Collection which provides an icon-driven, simple and easy to use environment, as well as a word processor and painting package. Not only does this allow you to write documents easily, but also to insert charts and graphs into them. Thereby improving your business presentations.

Though business is only one of the areas in which the Master 512 will be taking control.

In the Medical field, it could be taking the drudgery out of repeat prescriptions. At the same time monitoring dosage for optimum patient care.

Existing BBC Micros are capable of running an entire factory. The more sophisticated Master 512 could check every stage in a manufacturing process from beginning to end.

Of course, your immediate needs may not be on quite this scale. So you could buy the Master 128 now and easily upgrade to the Master 512 at a later stage.

THE LABORATORY.

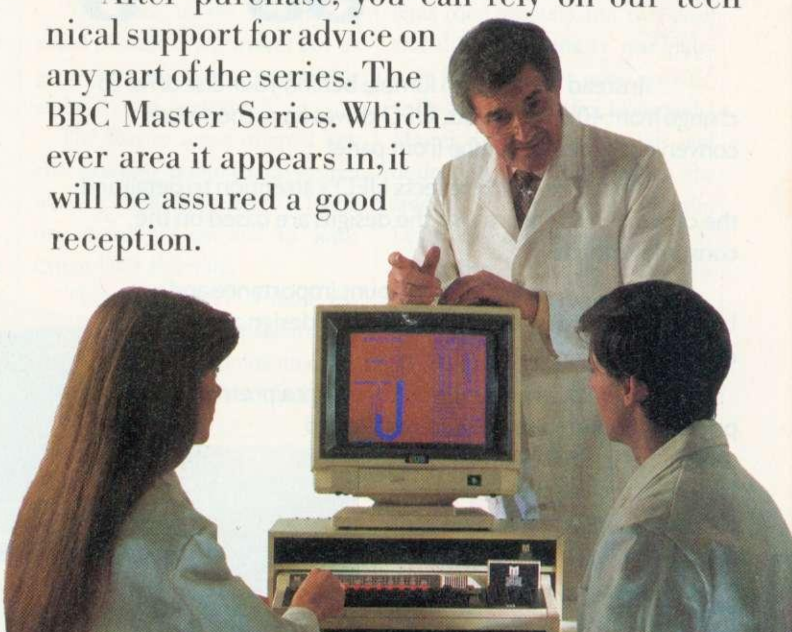
As a simple upgrade to the Master 128, the Master Sc. provides a powerful scientific computer for under £1,500. A tenth of the price of its nearest mainframe equivalent.

The Master Sc. forms a natural and compatible link with the first in the extremely powerful Acorn Cambridge Work Station range.

Naturally it uses all the important scientific languages – ISO PASCAL, FORTRAN 77, C and 32016 ASSEMBLER as well as BBC BASIC.

For anyone who is teaching languages, the Master Sc. is a particular asset. You can now afford to teach more by practice rather than theory.

After purchase, you can rely on our technical support for advice on any part of the series. The BBC Master Series. Whichever area it appears in, it will be assured a good reception.



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MASTER SERIES MICROCOMPUTER

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DVANCED DISK FILING SYSTEM. *THE MASTER 512. 512K RAM 128K ROM CAPACITY. 80186 PROCESSOR – GEM COLLECTION FROM DIGITAL RESEARCH. MOUSE.
XTRA 64K RAM CMOS PROCESSOR. HI-BASIC, HI-EDIT AND PRINTER-BUFFER EXTENDER. *THE MASTER SC. NATIONAL SEMICONDUCTOR 32016 PROCESSOR. 512K
AMBRIDGE TECHNOPARK, DEPT (AU1), 645 NEWMARKET ROAD, CAMBRIDGE CB5 8PD.

*Check availability with local dealer.



We've put our finger on a nagging little problem.

Instead of having to fumble behind your disc drive to change from 40 to 80 tracks, UFD drives have the switch conveniently located on the front panel.

A feature which reflects UFD's attention to detail and the care taken to ensure that the designs are based on the consumers needs.

Quality, too, is of paramount importance and UFD are proud of their high standard of design and quality control.

All of this may lead you to expect a premium price - not so. In spite of the care taken to ensure that UFD's complete range of single and twin disc drives meet the most demanding standards (manufactured to BS 415 - approval pending); UFD drives are competitively priced - ask your dealer for details.



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NEWS

New faces to perk up the Beeb

Two programs have appeared to give the BBC micro a whole range of different type styles and faces using the Epson, Canon or Taxan Kaga printers.

Fontwise from Clares for Epson printers offers ten type faces on a £12 disc designed to work either with *Wordwise* or with straight ASCII text. More information from Clares, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7DA. Tel: (0606) 48511.

For the Canon PW1080a/1156 and Taxan Kaga KP801/910 printers CJE Micros has developed *Fontaid* with nine new type styles. Fonts are added by replacing the ROM chip in the printer by either a *Fontaid* ROM or a RAM chip. Single font ROMs are priced at £18 per font.

Greek

The RAM chip plus disc of nine fonts together with a utility allowing you to define your own new faces costs £34.

An additional £18 disc is available containing further faces including the Greek alphabet.

Details from CJE Micros, 78 Brighton Road, Worthing, West Sussex BN11 2EN. Tel: (0903) 213900.

Master monitor

BBC Soft's machine-code monitor ROM for the BBC B is the first programming tool to cover the new features of the Master 128.

The monitor can handle the additional 'op codes' of the Master's 65CO2 processor and can explore the machine's shadow RAM switching in and out by means of a menu option.

It also contains a disc sector editor for the Master's ADFS disc operating system.

The BBC Soft Monitor ROM costs £39.95.

Master sell-out boosts market

by David Kelly

Acorn's new Master micros have proved a shot in the arm for the BBC market with an enthusiastic reaction from dealers and software houses alike – and initial stocks sold out within days.

Some dealers had been mounting a 'bring back the model B' campaign before Christmas and were showing little enthusiasm for the B+. But that has all changed.

'Acorn is doing it properly this time,' said Jay Mehta at dealers Technomatic. 'The expandability is what makes the machine.'

Vig Boyd at Viglen echoed the sentiment: 'Everything looks very good. It has injected new hope into the BBC market and will give Amstrad a thing or two to think about now.'

Nazir Jessa of Watford Electronics said: 'Its facility to upgrade to 16- and 32-bit makes it a machine with a very long life ahead of it.'

Software houses have also welcomed the arrival of the Master.

'It is a lot easier to write for the BBC Master than the BBC Plus,' said Charles Moir of Computer Concepts. 'The Master is better value than the B+, more expandable and more compatible.'

A priority for most software houses is to configure existing BBC B material to work with the Master series.

Mirrorsoft's Stephen Mercer explained: 'Our first task is to adapt our existing software titles to work on both machines, before considering products for the upgraded machines.

'The price of the Master 128 could be seen as a problem but its great strength is it is expandable and can grow with you.'

The Master series offers a low cost starting point for a system which can be expanded to a 16-bit one running Gem and to some extent IBM software.

'The Atari 520ST is more expensive and isn't expandable to the same degree,' commented Jay Mehta. 'Although the Amiga is powerful it has a very high entry price unlike the Master.'

Steve Powell, manager at Electronequip, said: 'The Master will probably take a bit of getting used to for seasoned BBC B users



Master: well-received by the trade

because of its three operating systems (one machine and two disc) and different memory manipulation, but it is a very good system.'

Deliveries of the base-model Master, the 128, to retailers and dealers began right after the launch. Several branches of John Lewis had stocks. Strangely, W H Smith had yet to be shown the new machines by Acorn, and Dixons would not comment on whether they would take them.

Dealers are unlikely to see the expansion cards until March. However, Watford Electronics sold its first five Master 128 models within a week and has a Master Turbo for demonstration.

Nazir Jessa said public reaction had been one of excitement: 'They like the potential of being able to expand to 16- and 32-bit, they like the compatibility with the existing BBC micro and the majority are not worried about it not being very PC compatible.

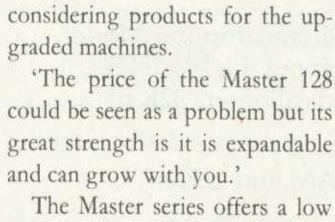
'If it was £399 rather than £499, with all its built-in software and expansion potential it would kill the competition.'

Add-on RAM for speed

A 128k or 256k RAM add-on unit has been developed for the BBC B which fits into a half-height disc drive case.

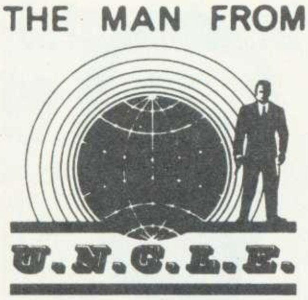
It plugs directly into the 1MHz bus and has its own power supply and control software on ROM. Up to two 256k units can be hung on to the Beeb.

The RAM can be used for high-speed data storage and retrieval of large blocks of memory. The



RAM is used much like a RAM-disc and can be accessed faster than is possible using a disc drive. The 128k unit, complete with ROM operating software costs £145. The 256k version is £199.

Details from Seawell Automatic Controls on (0264) 790911.



Protection is a necessary evil – I think we would all agree with that. Software producers are entitled to the fruits of their labours. On the other hand the punters are entitled to a little consideration in return for their hard-earned cash.

If you were to buy, for instance, *Beach-Head* from US Gold and you also happen to be the proud owner of a Solidisk or ATPL sideways RAM board, you would find that the same wouldn't run.

It's the same with other sideways boards as far as I know. So you have two choices – take it back or crack the protection.

The disc version of Superior Software's excellent *Citadel* won't run under Solidisk's DFS 2.0, just because of the way it handles a particular error. You could say that it's up to Solidisk to stick exactly to the Acorn protocols, but I'm glad they didn't – theirs is a better DFS than Acorn's. Anyway, my now unprotected version of *Citadel* runs under Solidisk thanks to a little jiggery-pokery.

I can understand the paranoia of the software houses when rip-off is rampant, but if they are going to protect their stuff they should at least do it well and cause the user the minimum hassle.

Having sorted out the software industry, let us now turn our attention to Acorn. When did the 32016 co-processor escape from the factory? I've begun to notice discreet advertisements for it at £1400 excluding VAT.

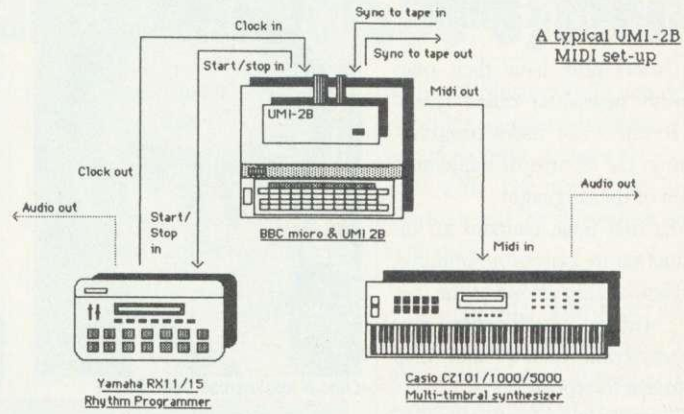
With a price like that I'm not surprised that the company is being a bit reticent, but with all the bundled software they could at least make some attempt at telling the world at large what a wonderful thing it is.

It is, isn't it?

Facing the music

This diagram shows a typical BBC-based system with keyboard and drum machine connected to the UMI interface which is controlled from the BBC micro. Once a tune is composed, it can be stored on disc and played back later.

The standard MIDI interface to link to musical instruments is built into the UMI.



Be top of the prizes

Win a BBC-based professional music system by just writing a piece of music – that's the idea behind 'The Great Music Competition' in next month's issue, and no knowledge of computers is even needed!

We're giving you fair warning because the prizes take some beating (and we want to hear some great music):

- Master system with monitor and disc drive worth about £700
- UMI 2B interface worth almost £500
- Professional keyboard costing around £200.
- 25 copies of the Ultravox Collection album.

And to judge the entries we're pulling in some of the biggest names in the electronic music business including Chris Cross of Ultravox; Linton Naiff, musical arranger and designer of the UMI and Ed Jones who runs the London Rock Shop, which is supplier to well-known bands such as Dire Straits and Madness.

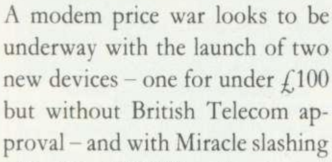
What you have to do is write a single which you feel could be a chart topper. The entries will be judged solely on how likely they are to make it, so musical ability rather than the hardware behind the entry is what will win.

Entries recorded direct to tape, played on a computer, recorded in a studio, written using any of the music software or hardware such as Island Logic's Music System or the Music 500 will be accepted.

But don't send in your tunes yet. Start composing and buy the April issue for the details.

Trade arms for modem price war

A modem price war looks to be underway with the launch of two new devices – one for under £100 but without British Telecom approval – and with Miracle slashing £20 off its WS2000 with software.



Magic Modem: under £100

DataStar's Magic Modem for the BBC micro, at just £99.95, includes operating software in ROM chip. The Voyager 7 with ROM comes in at £103.44 from Modem House and carries official BT approval.

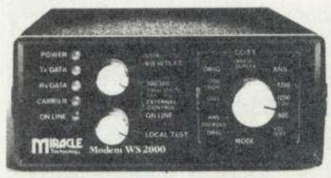
On the same day as the Voyager's release, Miracle Technology cut £20 off the price of its popular WS2000 modem and chip combination bringing it down to £153.75.

All three devices offer similar facilities including 1200/75, 75/1200, 300/300 full duplex and 1200/1200 half duplex selectable baud rates.

The Magic Modem and Voyager 7 include an autodial facility and the Voyager also has auto-answer as a standard feature.

The Voyager ROM, written for Modem House by Soft Machinery supports all Prestel functions, including frame tagging, telesoftware down-loading, printing and frame editing. It also supports all major networks and databases with 40/80 column terminal emulation, X-Modem protocol, data spooling and file transfer.

The Magic Modem ROM is claimed to have a powerful directory system and to support the major databases, X-Modem protocol, frame tagging and back-tracking.



Miracle WS2000: price slashed by £20

Both the Voyager 7 and WS2000 modems are approved for connection to the telephone network. DataStar has yet to gain approval for its Magic Modem, but said its application was being processed.

- Government body threatens tighter modem controls – see page 10 for details.

Lisp with Lambda

Lisp users now have their own monthly newsletter called *Lambda*. It caters for users programming in the Acornsoft implementation of the language.

The first issue contains an introduction to Lisp programming, a review of Lisp as one of the two key artificial intelligence languages, book reviews and Lisp programs to type in.

For more details contact J S Wellsman, 294a Caledonian Road, London N1 1BA. A subscription to the first three issues costs £5.

Tubelink in print

Tubelink, the Prestel database of BBC micro technical information, has made its specialist expertise, documentation, articles and reviews available to non-Prestel subscribers.

The information, including articles on machine-code, using the Tube and sideways programming, is available by post at a nominal charge. For more information send an sae to Benjamin Rietti at: Tubelink, PO Box 641, London NW9 8TF.

Admin index

School administration software is indexed by Patrick Bird, author of the book *Microcomputers in School Administration*, Hutchinson Education, £9.95. He produces a directory which is updated twice-yearly and is available at £2 including postage from Patrick at The Copse, Thornbury Road, Alveston, Bristol BS12 2LJ.

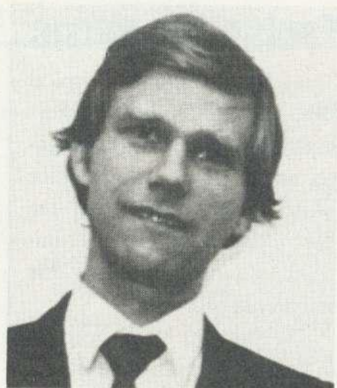
Plotting designs

The PL Graphics System by BS Dollamore Ltd now works with the £249 Penman robot plotter. A prepared design can be copied on to a BBC micro via a digitising tablet or drawn direct by freehand. It costs £125 for the hardware and software.

Details from BS Dollamore Ltd on (0283) 217905.



Labour spokesman John Smith





Hermann Hauser (left) and Chris Curry, the founders of Acorn

What Labour would have done for Acorn

A Labour government would have stepped in to save Acorn rather than see the company go to Olivetti – that's what the party's industry spokesman John Smith has told the press.

'I wouldn't have let Acorn go to the b***** Italians,' he proclaims in the computer industry paper *Microscope*. 'I'd have hauled them in . . . told them they had made asses of themselves and I'd have got a state holding company and I'd have put some good lads on the board and told them "Right you're British – now go out and grab the export markets".'

The 'them' Mr Smith refers to are the two founders of Acorn, Chris Curry and Hermann Hauser (who is Austrian).

Government hots up campaign on modems

by David Kelly

The Government looks set to step up its campaign against computer users connecting non-approved modems to the phone network.

Offenders already face a £2000 fine and losing their equipment. New moves include:

- Screening applications for communications networks such as Prestel and Micronet, and preventing users of non-approved modems from joining
- Stricter enforcement of rules governing advertising of modems
- Legislation before Parliament this spring on advertising and modem approval.

Oftel, the Office of Telecommunications, is charged with policing the market, but it is also getting help from approved modem manufacturers which are reporting companies breaking the rules on advertising.

Every advertisement for communications equipment must display either a green 'approved' circle or a red 'prohibited' triangle label (which must also appear on the device itself).

However, many modems advertised for use with the BBC micro have not gained BABT

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

British Telecome S/1000/3/D/021570

The approved sticker for modems

(British Approvals Board for Telecommunications) clearance and are not using the red label.

Many of these companies are critical of the approval procedure, claiming it is time-consuming and expensive. An application for clearance to Oftel costs the manufacturing company £1000, which is forfeit if it fails.

Opponents of the system, such as Martin Paine from Walkbury Consultants which sells the £95 Demon modem, say the application fee acts as a deterrent to manufacturers seeking approval.

'We haven't made a formal application to get the Demon approved yet because we are still feeling our way, trying to ensure that when we do it will be accepted and we won't lose £1000,' Mr Paine explained.

'It will be months before it will become an approved product.'

But Oftel spokesman Malcolm Clifton refuted the criticism: 'The approval charge is quite reasonable. It covers not only the cost of testing but also a one-off insurance premium which covers the manufacturer against claims for any damage to the BT system.

'If approval goes smoothly it can take as little as six weeks,' Mr Clifton added.

Applications for Micronet and Prestel must now also be accompanied by details of the user's equipment and Oftel plans to step up its efforts to ensure that owners of non-approved modems cannot get membership.

Help at hand on discs

Two discs containing useful help information about the BBC micro's operating system and Basic are now available. Each 'Rom image' is loaded from disc into a 16k sideways RAM pack, so that help information can be called up while the machine is in use.

The first contains details of all operating system routines and most FX calls: Acorn DFS details (plus 8271 OSWORD routines), memory maps, screen modes, Teletext codes, colours, VDU code summary, ASCII code summary, Epson compatible printer codes, print formatting and logical and indirection operators.

The second gives information on all Basic keywords including a brief description of function and syntax, minimum abbreviation, keyword type and a list of other relevant keywords, including examples when required.

The two ROM images come on a 40- or 80-track disc or cassette at £3.50 each or £6 for the pair.

Details from Robert Johnson, 29 Pretoria Road, Cambridge CB4 1HD. Tel: (0223) 311988.

Beeb memory bank

Richmead Micro has developed a 64k printer buffer – enough to store 16 pages of A4 for your printer and so free your Beeb's memory for other uses.

The unit costs £95, and a 256k unit costs £145, both plus VAT. Richmead Micro, 29 Easby Way, Lower Earley, Reading RG6 3XA.

Hybrid expands Music 500 system

Hybrid Technology is to launch the long-awaited expansion modules for its Music 500 system in April – including the Music 200 MIDI interface.

MIDI (musical instrument digital interface) is the communications protocol used by professional music equipment to link synthesisers, drum machines, samplers and sequencers together so that they can share data.

The Music 200 will plug directly into the 1MHz bus and enable electronic music hardware to be programmed and driven directly from the BBC micro.

The company also has the Music 400, a full-size four octave music keyboard for use with the Beeb and Music 500. In addition, Hybrid is up-dating its Music 500 system to make it easier to get to grips with. The manual has been rewritten and the software is now in modular form.

Ample Nucleus is the core program supplied in BBC ROM form which will be needed to drive any of the Music series of peripherals. A system disc will also be required to drive each of the devices – ie, to drive the Music 500, the M500 module disc must be used. The same applies to the M200 and M400 software modules.

'Any program you write on the computer will look identical on-



Music 500: in line for update

screen, regardless of whether it is being run on the Music 500 and 400 units, or whether it is being run on the Music 200 with, say, a Casio CZ101 synthesiser hooked up to the MIDI', explained Hybrid's Chris Jordan. 'The difference, of course, is that it will sound different, depending on what you play it through.'

The Music 200 and 400 units, the new software driver modules and manuals are now in their final stages of development. No prices have yet been finalised.



The January front cover of *Acorn User* – prepared with the 'Super Painter' listing in that issue – was used as an example of the excellent graphics possibilities of the BBC micro at the launch of the Master in London last month.

Jonathan Inglis who 'painted' the cover was 'artist in residence' during the four-day launch showing just what the machine could do, and said 'The extra graphics of the Master are going to have terrific implications for existing software. Everyone I spoke to was keen on those.'

Jonathan was an art teacher when he first used a BBC micro and his work has been seen in many areas since, including the *Sunday Times* magazine.

Chalksoft titles for the Electron

Chalksoft has converted its range of educational programs to run on the Electron.

The eight titles are: *Eiffel Tower, Das Schloss, Note Invaders, Puncman 1 and 2, Puncman 3 and 4, Metrics Quiz, Triangles, Letters* and *Capital Letters.*

Price for the Electron versions is £9.25, apart from *Capital Letters* which costs £11.25.

Chalksoft, PO Box 49, Spalding, Lincs PE11 1NZ.

Wordpower offers 'background' printing

Wordpower, a wordprocessor for the BBC micro and Electron, comes on a chip for £39.50 from Ian Copestake, and features 20, 40 and 80 column displays.

The text format for centring, justification, etc, is shown on the screen, along with a word count. One of the program's main features is that printing is done in the 'background' so that you can continue using *Wordpower* while a document is output.

Mailmerging is supported, including the option to take files from Acorn's *ViewStore* database.

Wordpower runs on the BBC B, both B+ models, as well as DFS, 1770 ADFS, ADFS and Econet filing systems. E-Net users are also supported. It can be used on any printer.

Owners of the 6502 second processor can order a disc version which makes use of the extra memory for just £35.

Contact Ian Copestake at 23 Connaught Crescent, Brookwood, Woking, Surrey GU24 0AN for further details.

Now we speak

Français Ελληνικος

The KBL128PC is remarkably fluent in languages – not only in BBC English, but in its choice of operating systems. If you think in French, Arabic or Greek, the KBL can be supplied with a keyboard for either language.

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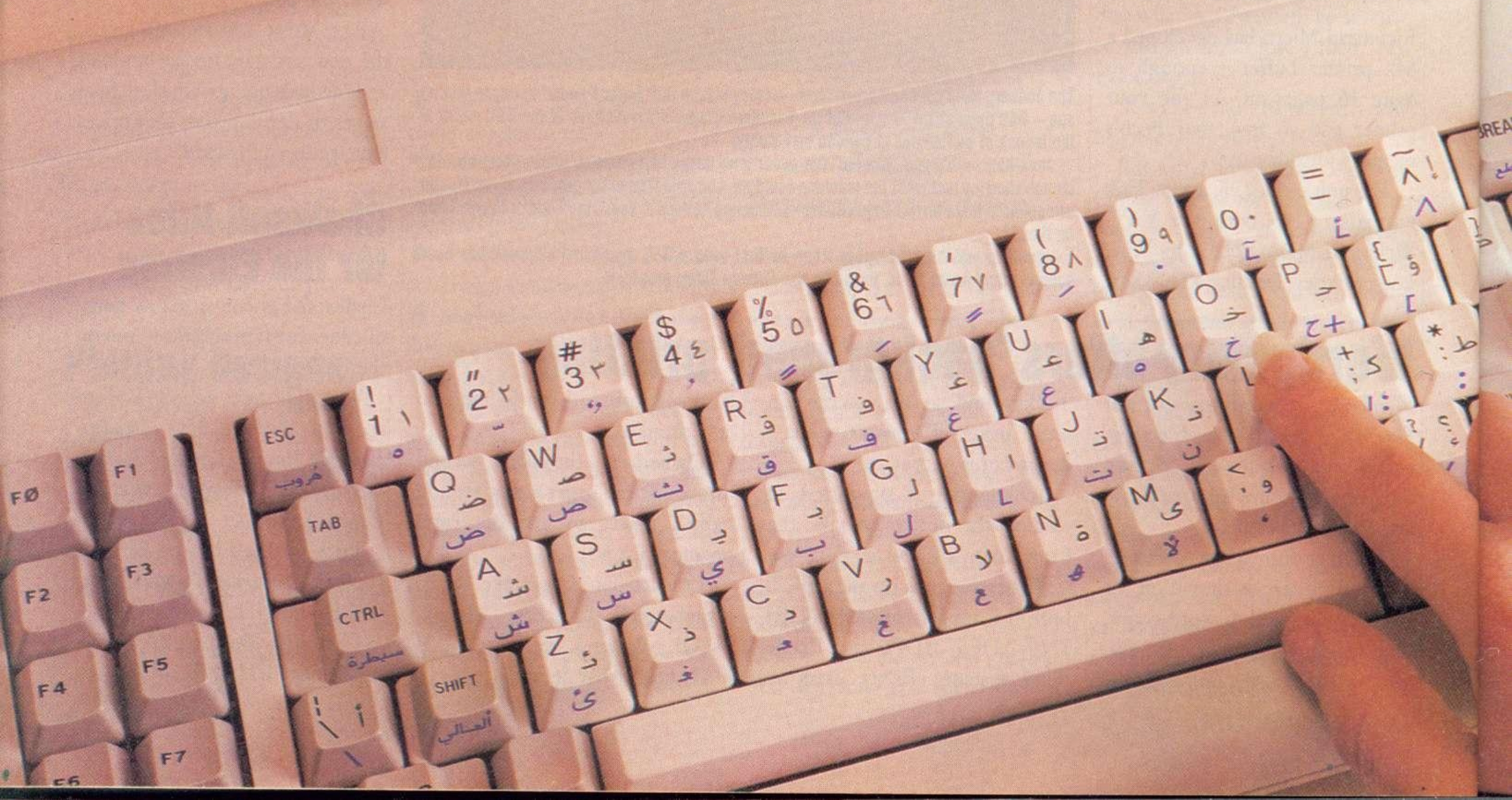


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Watford are pleased to announce that they are now stocking almost the entire range of Gemini's BBC software. Fuller descriptions of items may be found in Gemini's own advertising within this publication.

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Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

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£67

L.B.O.

Life & Business Organiser

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LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

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Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

L.B.O. only £17

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- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'

-PLOT £26

- Stunning menu driven colour graphics using the BBC's capability to the full.
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Combo Pack – All 3 modules £60

Money Management

This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

Each transaction consists of:

(1) Date
(2) Description – up to 16 characters.
(3) Amount
(4) Last 4 digits of cheque no. or a credit card transaction reference. (Payments only)

Account and income/expenditure headings may be personalised.

Budget amounts can be stored for each of the 15 expenditure heads and a report shows how expenditure to date compares with the budget. It also shows the balance remaining. This report is also produced in percentage terms and a third report forecasts annual expenditure based on expenditure to date at any particular time.

A further report gives balances for each Bank/Loan account at the beginning of the year, balances for each income/expenditure account to date and the resultant Bank/loan account balances. This report represents, therefore, the changes in liquid assets and liabilities over the period, both in terms of totals and of distribution between accounts.

The main menu contains a print option for this report.

Lists of outstanding cheques or credit transactions may be produced for each account and when statements are received, input of the cheque reference no. (last 4 digits) and the amount causes verification to occur (on screen), whereafter these cheques are removed from the cheque no. file, the remaining list of unpresented cheques allowing simple reconciliation of each Bank a/c Similar reconciliation of credit card a/cs can be achieved.

The program caters for transfers between accounts (e.g. from Bank to Building Society a/c or from Bank to Credit card a/c etc) the relevant details being input only once.

The program also allows for standing orders to be set up on any single account or between any two accounts. These are paid simply by inputting a date up to which the payment of all orders should be recorded. The necessary debits and credits are then created and the date of each order is reset. Orders can be for any multiple of calendar months.

The program is fully menu driven and all areas of input are 'range protected'. As much guidance as possible is included in all screen displays and the user is always given the opportunity to abort a transaction.

Full amendment and deletion routines are provided; for individual transactions, for Standing orders and for budgets.

The main file can hold between 800 (all full length descriptions) and 1800 (no descriptions) transactions. The former should be sufficient for most people for at least one year and the index file size is set on this basis. A warning is flashed on the main menu when the main file reaches 750 transactions. Account balances may be carried forward to a new set of accounts.

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Acorn man races to save tiger

An Acorn employee has £15,000-worth of promises which must be turned into hard cash, otherwise the life of a tigress he has fought hard to save could still be lost.

The promises were the result of a frantic race against time to save Roma who was due to be put down just three days after Martin Grantham learned of her plight.

Martin had been ordered to take a rest by his doctor following the hectic run-up to the launch of the Master when he saw a television programme about the closure of Knaresborough Zoo. Several large animals would have to be killed if a home could not be found for them.

He phoned the zoo the next day (Wednesday) and was told that Roma, an eight-year-old tigress in the prime of life, was due to be put down by the RSPCA just two days later. That set Martin off on his race, thinking he would only need to find £1500 by Friday to keep Roma at London Zoo – but they didn't have the room.

Desperate

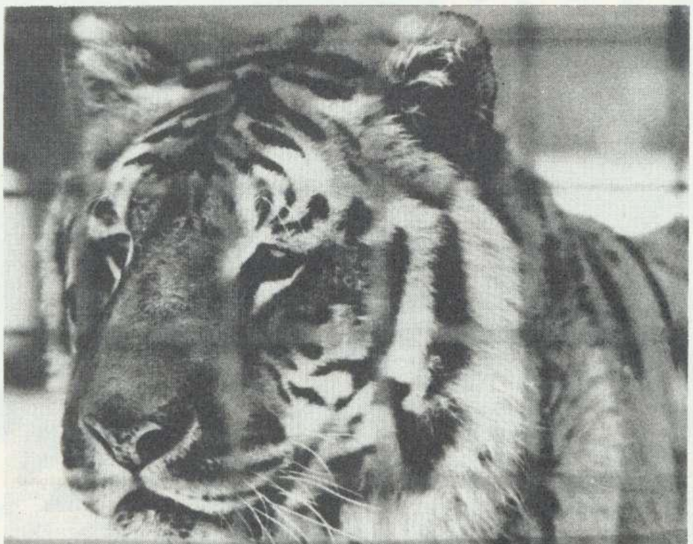
And there being no room at the zoo turned the race into a desperate one: 'I called Linton Zoo, which is the local one in south Cambridgeshire and talked to the owner, Les Simmons.

'He had the room, but would have to build an enclosure. I nearly choked when he said I would have to raise £20,000 by Friday.'

Martin's first thought was one of the large oil companies, who discussed his plea at board level, but were unable to help.

However, later in the day came a call out of the blue from a London clothing company offering £10,000. The RSPCA promised they would not put Roma down if Martin could get £5000 more in promises by the Friday.

BBC Radio Cambridge got hold of the story and broadcast it with their breakfast-time news bulletins on the Thursday morning. That resulted in a story in the *Cambridge Evening News* that evening.



Roma . . . her life hangs in the balance while promises are turned into cash

But the big break came at midday with a call from East Anglia TV. Martin explained: 'They said that if I could get over to Norwich by 3.30, then they would put the story out on the evening news programme.

'I made it and that night – until 1am in fact – the phone didn't stop ringing . . . and it started again at six in the morning on the Friday.'

So, Martin has the promises, the RSPCA will look after the tigress until the pen is built, the district council has offered a bridging loan and local builders will do the job: now the cash has to start rolling in.

'If the pledges are not met,' said Martin, 'then Roma will suffer the same fate as a lion, two bears and a puma at Knaresborough, and be put down.

'They were ill anyway and wouldn't have survived the move, whereas Roma is a healthy lioness in her prime for breeding.'

The Save the Tiger Fund account is being held at the Midland Bank, 52 St Andrews Street, Cambridge CB2 3AH. Donations should be made to account number 41118722, and the branch's sorting code is 40-16-36. Any spare cash will go towards supporting other threatened animals at the zoo.

Mascot

And should Roma survive, she has a job ahead of her as mascot of RAF Squadron 74 based in Wattisham, Suffolk – although they fly Jaguar jets, their emblem is a tiger.

It was with some trepidation that Martin returned to work at Acorn however.

'There were a few muttered comments that I had done all this while off sick, but in the end I got the company's blessing. In fact my boss seemed more concerned that I might have made myself worse than anything else.'

We'll let you know how things have gone next month (and whether Acorn has made a donation!).

Satellites for schools group launched

A special group covering satellites in education has been formed with John Coll, the MEP's software manager, at its head.

The initial aims of the group, called the UK Co-ordinating Committee on Satellites in Education, include working out how to use satellite data in schools and what equipment will be needed.

Amateurs, universities and some secondary schools are already pulling down data – one of the leaders in the field being Surrey University which has put a series of satellites into orbit with its UOSAT project.

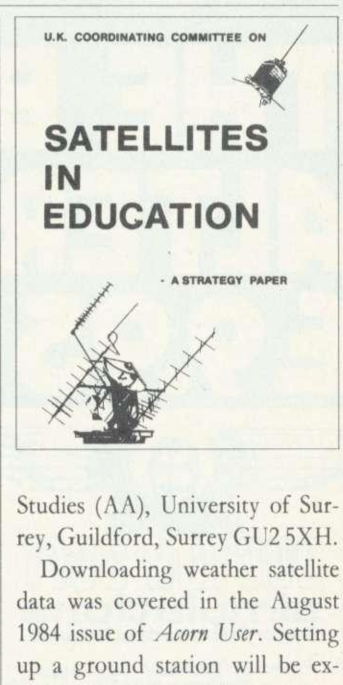
To raise the level of interest, Craig Underwood has written a booklet on the subject for the committee. This covers:

- educational possibilities
- orbits and tracking procedures
- equipment needs
- sources and prices of aerials and receivers.

It is available from Amsat, 94 Herongate Road, Wanstead Park, London E12 5EQ.

Cheques for £3.50 should be made payable to SEUK.

A free paper giving details of the committee is available from Dr John Gilbert, Educational Studies (AA), University of Surrey, Guildford, Surrey GU2 5XH.



Downloading weather satellite data was covered in the August 1984 issue of *Acorn User*. Setting up a ground station will be explained in a forthcoming article.

READER SERVICES

HELP US TO HELP YOU

The *Acorn User* Reader Services offer which we kicked off in October has proved a huge success – so much so that we have been inundated with enquiries. This article is to help us help you so that we can give you a better answer and even more value for your money. However, we have had to increase the reply time to 10 working days because of contacting hardware suppliers, etc.

Acorn User strongly recommends readers who are new to home computing, and even the old hands, to join their local computer club – you will probably find answers to many of your questions there. Your library should have details of your local club.

The enquiries we are getting fall into three main categories: hardware, software and add-ons.

Dealing with hardware problems is difficult, in fact without the necessary test equipment it is often impossible to give an answer. We can suggest tests but it is likely that we will recommend that you take your micro to an Acorn approved dealer who has the correct equipment to perform hardware diagnostics, and can actually lay hands on the equipment.

Software is more straightforward, but we need to try it for ourselves, so send in a disc and any listings, etc. Please give as much information about your program as possible by writing comments next to the listing or on a separate sheet of paper.

Finally add-ons. Problems are often uncomplicated, but once again we must have details of all your kit.

Many enquiries come in containing up to 10 questions, but £2 does not go far and a single problem can take 30 minutes to solve. Of course you are free to ask as many questions as you wish, but you must send £2 per question otherwise only the first one will be answered.

When you write to Reader Services please provide as much information as possible, clearly and concisely.

First, print a list of all your equipment. This example shows a typical information sheet:

Name:	Orson Fact
Address:	Sleuth Cottages Detective Drive Hidden Sherlockshire
Telephone:	(0999) 1234 (home) (0999) 1212 (work)
Equipment:	BBC B+ 128 OS 1.2 Watford DFS 1.4 ADFS Network
Internal extras:	Solidisk modem Watford ROM Board
ROMs:	Graphics Extension 1.2 Basic Editor 1.2 View 3.0 Disc Doctor Novocad
Peripherals:	10 Mb Winchester Hard Disc Colour Monitor Technomatic Dual 80/40 Drives Star SD10 Printer 6502 2nd processor
Other details:	Issue 10 board, 2 months old Other equipment, 18 months old but previously used okay on BBC B. Purchased at Bloggs Computers, London.

Such a list makes it possible for us to see at a glance just what you have. It's surprising how many readers don't give any details about their set-up.

The next thing we need to know are the details of your problems. Use a separate sheet of paper and print the details neatly, noting points such as: the problem itself, how long it has been happening, what started it off (if known), any remedies you have tried, any other information.

In the case of software, a disc (preferably) or tape *must* be included. If it is your own program, then a commented listing or well REMed program is essential.

With this information we can attempt to answer your enquiry quickly and efficiently and give you the speedy answer you want. Please allow at least 10 *working* days for your answer. Unfortunately we are unable to answer enquiries over the phone.

POST A PROBLEM

AS a result of pressure from readers, *Acorn User* now guarantees a fast reply service for enquiries. Your answer will be returned within 10 working days for just £2 (includes VAT), or your money back.

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If you want a listing debugged, advice on hardware or software, or a list of addresses, send us your problems.

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NOTICE BOARD

ON SHOW

● 25-27 March, Micros and Primary Education (MAPE) course and conference, Manchester Polytechnic. Details from Dave Whitehead, 550 Whitworth Road, Rochdale, Lancs OL12 0SW.

● 7-9 July, Third Insurance Information Exchange, Connaught Rooms, London WC2. Specialist exhibition including hardware and software for the insurance industry. More details from Caroline Fletcher on 01-242 5275.

● 9 July, Computers in Science, Lancaster Polytechnic, Preston. This event, which is part of a course for further education teachers, will be open to the public. Potential exhibitors contact Mrs Minall at the Polytechnic's Business and Industrial Centre.

● 6-11 August, Festival Expo 86, Computers, Video Software and Games Exhibition, Stoke-on-Trent, Staffs. One of twenty exhibitions being held between May and October as part of this year's huge National Garden Festival. Over three million visitors are expected to visit the festival's purpose-built 180 acre garden site during the five months it is open.

ON TELEVISION

● *Micro Live*, BBC2, Fridays, 7.00pm.

FOR HELP

● To contact *Acorn User* authors, write c/o the editorial address given on page 2 of this issue.

● Remember you have until May 11 to register with the Data Protection Registrar if you are a business micro user who processes information about individuals. It costs £22 and failure to register is a criminal offence under the Data Protection Act, 1984.

Contact the Data Protection Registrar, Springfield House, Water Lane, Wilmslow, Cheshire SK9 5AX for advice and details.

● Seikosha AP/GP100 printer help sheets are available from *Acorn User* for 50p, plus sae. These consist of three programs, including a screen dump, and three pages of notes on using these printers.

● Bulletin boards: information on 26 free-access boards was given in the October 1984 issue. Send 54p for photocopy.

● Monitor choice: photocopies of the review of four monitors, plus a set of nine test programs from the June 1984 issue cost 72p (inc post). A copy of the issue costs £1.25 (see page 104).

TO CONTACT

● Acorn, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.

● Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411.

● Acorn's bulletin board service is Prestel-compatible (1200/75 baud) and runs on (0223) 243642.

● *Acorn User* cassette, discs, back issues and binders are available from PHS Mailings on (02934) 72208 (see page 104).

● *Acorn User's* page number on Micronet is 60043765. You can download *AU* software.

● BBC TV's *Micro Live* bulletin board is on 01-579 2288 (type INFO BBC on Telecom Gold electronic mail system).

● BBC Computer Literacy Project, Broadcasting Support Services, PO Box 7, London W3 6XJ. Please send sae.

● British Amateur Radio Teleprinter Group (BARTG) specialises in keyboard communications including RTTY, AMTOR (Amateur Telex Over Radio) and packet radio. BARTG also provides terminal unit kits and other communications hardware. For more details contact: Stuart Dodson, BARTG Chairman, G3PPD, 63 Malvern Avenue, South Harrow, Middlesex.

● Bulletin Boards: Two new bulletin boards are now available. BB-BBS (Brecon Beacons Bulletin Board Service) offers free software and hints and tips. The board operates on 300/300 baud and is currently open between 8pm and 8am on (0874) 730692. On-Line Systems Bulletin Board gives details of Hartlepool Computer Services range of new and second-hand computers. It operates on both 300/300 baud and 1200/75 baud on (0429) 34346. Other boards: BB-BBS (0874) 730692; CABB 01-631 3076; CBBS London 01-399 2136; Distel 01-679 1888; Forum 80 Hull (0482) 859169; Forum 80 London 01-399 2136; Grendel (0532) 620334; HAM-NET (0482) 497150; Liverpool Mailbox 051-428 8924; Mailbox 80 (0384) 635336; POT-BUG (0782) 503254; On-Line Systems (0429) 34346; Owltel (BBC Publications) 01-927 5820; Technomatic 01-452 1500; TBBS London 01-348 9400; TBBS Nottingham (0602) 289783; TBBS Southampton (0703) 437200.

● MEP (Microelectronics Education Programme), Cheviot House, Coach Lane Campus, Newcastle-upon-Tyne NE7 7XA. Hardware and software support for schools. Please send sae.

● MAPE (Micros and Primary Education), c/o Mrs G Jones, 76 Sudbrooke Holme Drive, Sudbrooke, Lincs LN2 2SF. User group for primary teachers. Please send sae.

● MUSE (Micro Users in Schools and Education), PO Box 43, 231/2 Friary Chambers, Whitefriargate, Hull HU1 2HD. Tel: (0482) 20268. User group for teachers and parents. Please send sae.

● National Extension College, 18 Brooklands Avenue, Cambridge CB2 2HN. Educational and training courses on the BBC micro. Please send sae.

● CET (Council for Education Technology), 3 Devonshire Street, London W1N 2BA. Government body which oversees MEP. Please send sae.

● Software Limited configure CP/M programs for the BBC micro. Write for a catalogue to No 2 Alice Owen Technology Centre, 251 Goswell Road, London EC1N 7JQ. Tel: 01-833 1173.

● Twillstar has moved into a new office and showroom. The phone number remains the same, but the address is Apex House, Blandford Road, Norwood Green, Southall, Middx UB2 4HD.

BLUNDERBOX

● As Mr Orton of Slough pointed out to us, it is easy to save screens from January's *Super Painter* program when using a 6502 second processor by changing lines 2060 and 3720 to read:

```
 2060 *SAVE WF FFFF3C80 FF
FF7D80
 2100 *LOAD WF FFFF3C80
 3720 PROCoscli("SAVE "+FN
inpname+" FFFF3C80 FFFF7D8
0")
 3750 PROCoscli("LOAD "+FN
inpname+" FFFF3C80")
```

Apologies to Mr Orton and all other Tube users.

● Apologies also to those who typed in the data compression program by D J Pilling, published in the December 1985 issue of *Acorn User*. The checksum routine did not take account of different filing systems being in use and so line 2190 should be changed to:

```
 2190 IF Z%=21315 OR Z%=21
415 OR Z%=21196 OR Z%=2161
4 THEN ENDPROC
```

● Tessie Revivis dropped a small clanger last month in First Byte. The resident integer variables do not include a% to z%.

● In the business news section of the February 1986 issue we told you that the 68000 is a 32-bit microprocessor. It is of course only a 16-bit chip. Thanks to Tim Greening-Jackson for pointing that one out.

● The following line should be added to the First Byte listing on page 106, December 1985:

```
461 PLA
```

Also, change line 1030 to:

```
1030 IFHC%<>12786
PRINT"Listing error":END
```

● Apologies to those readers who typed in the font generator program on page 117 of the December *AU*. Two problems have been discovered and the following lines must be added to the program in order to overcome them:

```
   94 *FX 20,0
   95 A%=&83
   96 hwm%=(USR(&FFF4) AND
 &FFFF00)/256
  100 IF PAGE<>hwm%+&600 T
HEN PRINT"Reload at &";~hw
m%+&600:END
  101 *FX 20,6
  102 FOR c%=&20 TO &E0 ST
EP &20
  103 ?oscli%=c%
  104 X%=oscli%:Y%=oscli%
DIV 256
  105 A%=&A:CALL &FFF1:VDU
 23,c%
  106 FOR b%=1 TO 8:VDU b%
?oscli%:NEXT
  107 NEXT
 1070 PROCoscli("SA. "+F$+
" "+STR$~hwm%+" +600")
```

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MICRONET800 dec 85

NEW

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(Includes System Delta support)

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Access

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When we introduced our AMX Mouse to BBC Micro users, the response was phenomenal.

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AMX Super ROM and Super Art adds colour to the features of the original AMX ROM, on a new 16K ROM.

It dramatically extends the original AMX ROM facilities to include Pull Down Menus, over lapping colour windows, colour patterns and an extended Icon set in all graphic modes.

Specially written to be usable with the vast majority of BBC Systems including 2nd processors, the Aries RAM Board, the BBC + Shadow mode, tape, DFS and ADFS.

The kernel of the Super Art program is included in the 16K ROM, providing tape and disc users with a Mode 1 colour drawing program.

But Super Art really comes into its own when used on a disc based system; a host of additional facilities can be selected direct from the screen.

Colour pictures can be created in dot resolution up to A4 size by scrolling the screen window, over the picture.

Other facilities include colour pattern editing – use of icons, additional text styles, various copy facilities and a superb colour Zoom.



Pictures can be printed out in colour (Integrex) or shades of black and grey on Epson compatible printers.

The results can be astonishing! – you can even store your finished 'masterpieces'.

The AMX Icon Designer facility gives you further freedom to design and store your own custom icons for use in your own programs.

This fabulous new package costs only £89.95 – a price as remarkable as the package itself – and includes a fully illustrated operating manual.

If, however, you are afraid of mice, you can purchase just the software package plus the 16K Super ROM for just £49.95.

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iMAGiN.A

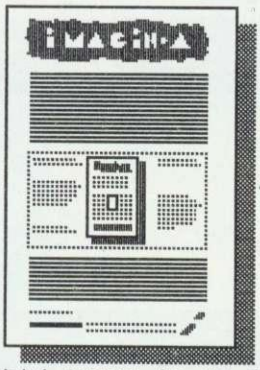
iMAGiN creating fully illustrated documents with just a BBC micro, dot-matrix printer, word-processor program and iMAGiN.A.

iMAGiN.A is an artwork creation program with user-friendly icons and pull-down menus controlled by mouse, trackerball, Grafpad or cursor keys. A full range of icon-selected drawing features include line-drawing, outline or filled rectangles, polygons, circles, ellipses and arcs, freehand brushing, symbols, text, cut-and-paste, erase, automatic rubber-banding, snap-on grids, co-ordinate display, etc., etc.

Pull-down menus allow filing operations, option settings and selection of line styles, brush shapes, typefaces, fill patterns and symbols. You can define your own fonts, patterns and symbols to supplement those in the program. Images can be up to 8 x 9 in. with fast screen scrolling.

*commands allow images to be easily incorporated into text files and printed out automatically with text, either directly or from word-processors. Use iMAGiN.A to illustrate reports, papers, manuals, advertisements (like this) with diagrams, sketches, maps, charts, captions,.... Use your iMAGiN.Ation!!

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heading graphics created with iMAGiN.A

text produced using word-processor software and printed out with headings, illustrations, etc. using *image and *insert commands

illustration of advertisement layout produced with iMAGiN.A using icon-driven drawing facilities, various line styles fill patterns and text fonts

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Unlike recent page-orientated programs for the BBC micro, iMAGiN.A is document-based and places no limits on the numbers of pages or images in a document. Whole illustrated documents are printed in one run on a standard dot-matrix printer. The price? - just £50 + £2 carriage + VAT.

iMAGiN.A takes full advantage of the 128k memory and highest-resolution graphics of the BBC B+128 and the powerful features of Acornsoft's GXR graphics extension ROM. This program is part of our growing range of personal design software for the BBC B and B+ including Digital Drawings and DDX (2-D CAD), 3-D View (3-D modeller), and ice (insulation+condensation evaluator).

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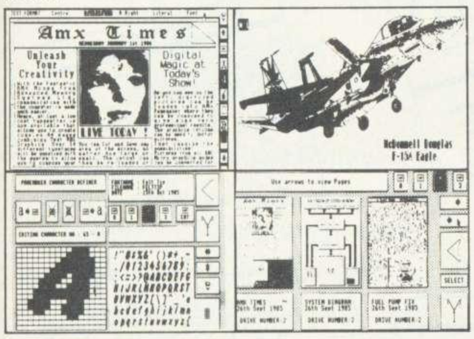
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There are outstanding facilities for drawing, spraying and painting, using either the patterns supplied, or your own pattern designs, enabling you to achieve some incredible graphic results. A complete Mode conversion program is included allowing you to load in drawings and digitised pictures from all BBC graphic modes. The cut and paste facilities include: copying, moving, rotating, stretching and a fantastic zoom is also available.

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* 'Educational Computing', January 1986.

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AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 x 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

TECHNICALLY SPEAKING

The System Comprises:-

1. 2 EPROMs mounted on carrier board containing 24K of 6502 optimised machine language. Carrier board may be inserted in either of two positions under keyboard or in sideways ROM board.
2. Demonstration applications disk in both 80 and 40 track format with documented examples of DataGem files. Disk contains no DataGem program code.
3. Full colour packaging consisting of A5 ring binder with professional documentation, user registration card and quick reference card.
4. Utility program named 'Trans' also supplied to allow transference of data files from all other Gemini databases.

The System Features:-

- Permits just ONE file to exist over FOUR floppy disk drive surfaces with a maximum file size of at least 10 Megabytes.
- Allows up to 5100 User Definable Records.
- Maximum number of 62 fields per record, which may be any combination of the following types:-
  STRING – Up to 120 characters long
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  NUMERIC
- Allows searches on any field or COMBINATION of fields to ANY depth.
- Up to 9 subsets of data INSTANTLY available and saved to disk automatically.
- Sorts alphabetical or numeric on any field, ascending or descending with NO LIMIT on the depth of sort.
- Interfaces with 'VIEW' and 'WORDWISE'.
- Includes a free format report generator for a completely flexible printing format.
- Allows the user to extend the file or add fields after having started to enter data.
- Offers a free format painted screen which scrolls 120 x 120; and supports extensive mathematics.
- Provides User defined field relational variables and multiple and single character wildcards.
- Exists self contained on ROM, and does not require additional utilities on disk.
- Finds the occurrence of a string or partial string in ANY field in the database with just one command.
- Mathematical Operators
  +, –, ★, /, multilevel parentheses (up to 50 levels), unary negation.
- Logical Operators
  >, <, >=, <=, <>, =, ★(AND), +(OR).

WHAT OTHERS SAY

DataGem provides many of the Spreadsheet facilities of an item like Lotus 1-2-3... Combined with a Word Processor, it forms the basis of a very competent small business system.
Personal Computer News – July 1984.

DataGem stands out in terms of both price and performance. Excellent if you can afford it.
Acorn User – December 1984.

NEW DATAGEM GUIDE

Available separately to existing owners of DataGem (see below), this new and comprehensive manual has just been completely re-written by Simon Williams, a veteran press reviewer and writer. The new guide takes you step by step through all the facilities of the program with worked examples, and without any requirement for a previous knowledge of databases. It contains over 40,000 words and is fully indexed.

MONEY-BACK GUARANTEE

The power and facilities of DataGem are just too great to detail in this advertisement. As the product is protected against unauthorised copying, we are able to offer our no-quibble money-back guarantee to customers purchasing DataGem direct from Gemini. If you don't agree that it's worth the price, send it back to us undamaged within 7 days of purchase for ANY reason and we'll refund your money – immediately.

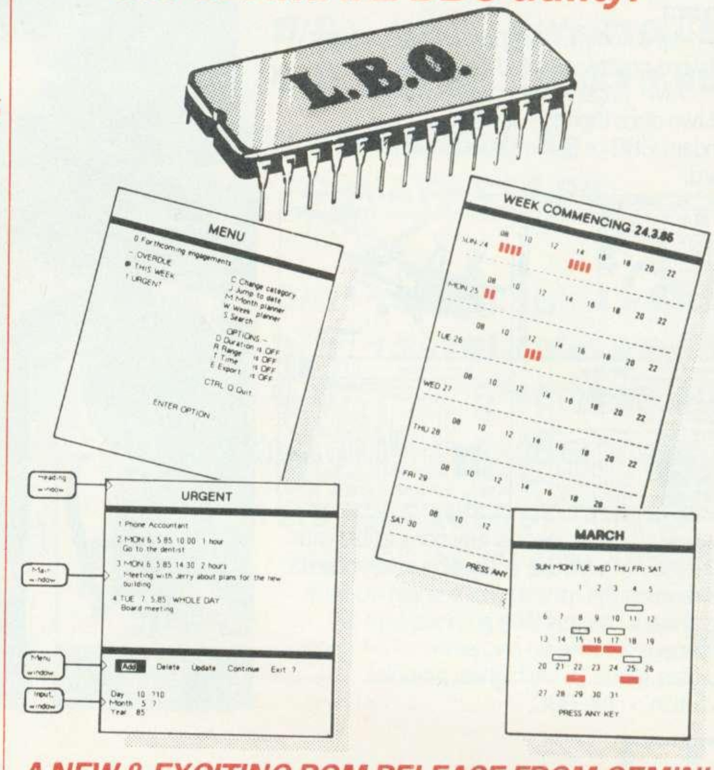


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New DataGem owner's manual (see above) available separately at **£12.95** inclusive
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LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

Features include:-

- Automatic reminder of entries overdue for attention
- One week's advance notice of forthcoming events
- Urgent notice board
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day
- Month AND week's summary at a glance, indicating time booked and free
- Single entry of a RANGE of events and updating of regular happenings
- Super search facility to call any event by any related word or part word
- Month by month preview of all forthcoming events
- Built-in intelligent calendar
- All data saved to disk
- Full printer support
- Easy to follow documentation

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are every likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!



L.B.O. only **£19.95**

Also available on DISK for those with a cluttered ROM board – £19.95.
QL version also available now, MS-DOS version early 1986.

Gemini ⟹ DISK SOFTWARE ⟹

DDD Suite

THE REVOLUTIONARY 'TRIPLE-D' BBC DISK INTEGRATED SOFTWARE SYSTEM

Of great significance to businessmen, educationalists and hobbyists alike, these programs are certainly the most powerful and sophisticated of their breed, and may be used 'stand-alone' or together as a suite. Gemini have probably the most experience in writing serious software for the BBC micro, with classics such as BEEBCALC and BEEBPLOT achieving sales of tens of thousands of units. We have drawn on almost four years of experience and user feedback to produce what we are confident will be hailed as the ultimate in functional software for the BBC micro: the ***'TRIPLE-D'*** Integrated Suite. We've also brought it in at a price that should make it accessible to more of you, and most importantly, we're giving you REAL value for money.

The modules, which are formatted for both 40 and 80 track systems, are available separately, or as an economical combination pack. Each module is clearly documented with a comprehensive, indexed manual, with training sections that refer to demonstration applications provided with each disk. Remember, ***'TRIPLE-D'*** uses proper random-access files that will take advantage of your true disk capacity, even over TWO drive surfaces. Have you ever heard of a true disk-based spreadsheet before? Well it's here now in the form of the ***'TRIPLE-D'*** suite and can handle up to 52,000 FILLED cells! If you already have our 'DataGem' ROM database, you'll be pleased to know we've even included some special utilities for you!

I confidently recommend the ***'TRIPLE-D'*** suite to you. If you purchase the product from us and don't share my enthusiasm, return it to us in new condition within seven days of purchase and we'll refund your money – immediately and without quibble.

Dale Hubbard
Chairman & Managing Director
Gemini Marketing Limited

DDD -BASE £29.95

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field
- Scrolling screen, 79 x 26. Interrupt driven real-time clock
- Layout painted on-screen to your design, including background text/graphics
- Fully menu driven, with powerful line editor and access to *OS commands
- Default entry capability, no need for tedious re-typing of repetitive data
- Lightning search using advanced 'hashing' techniques
- Powerful maths, allowing all BASIC functions, on any field
- 10 user-defined variables to simplify complex calculations
- Multiple level 'intelligent' sort – program only sorts 'out-of-order' data
- Printed reports in record or summary format. Data spool option for transfer to other files
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'

DDD -CALC £29.95

- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor
- Fast, smooth machine code screen scroll with pop-down menu
- Individually adjustable column widths with text overflow
- Full relative and absolute replication
- Find and move to a row by name
- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'
- Send data from all or part of sheet to printer, or just print cell formulae
- Data over 1 or 2 drive surfaces
- Fast recalculation, even over large files
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. *OS calls, and real time clock
- Data spool option for merging with other files
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'

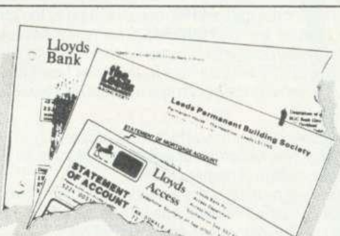
DDD -PLOT £29.95

- Stunning menu driven colour graphics using the BBC's capability to the full
- Pie charts, histograms, scatter graphs, line graphs and function plotting
- Disk save of screen for instant recall within your own programs
- Superb data entry editor with up to 255 plottable data entries for text and x/y coordinates
- Automatic scaling with user override
- Screen customisation allowable after plotting for background text etc., with up to 64 columns in Mode 1
- Disk save of ALL data
- Statistics facilities include mean, max, min, standard deviation, line of best fit, correlation coefficient etc.
- Colours re-definable for any plot
- Epson m/c fully SHADED screen dump with interface for other dumps on request
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-CALC'

Combo Pack – All 3 modules £69.95

NEW!

MONEY MANAGEMENT



This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

Each transaction consists of:

(1) Date
(2) Description – up to 16 characters
(3) Amount
(4) Last 4 digits of cheque no. or a credit card transaction reference. (Payments only)

Account and income/expenditure headings may be personalised.

Budget amounts can be stored for each of the 15 expenditure heads and a report shows how expenditure to date compares with the budget. It also shows the balance remaining. This report is also produced in percentage terms and a third report forecasts annual expenditure based on expenditure to date at any particular time.

A further report gives balances for each Bank/Loan account at the beginning of the year, balances for each income/expenditure account to date and the resultant Bank/loan account balances. This report represents, therefore, the changes in liquid assets and liabilities over the period, both in terms of totals and of distribution between accounts.

The main menu contains a print option for this report.

Lists of outstanding cheques or credit transactions may be produced for each account and when statements are received, input of the cheque reference no. (last 4 digits) and the amount causes verification to occur (on screen), whereafter these cheques are removed from the cheque no. file, the remaining list of unpresented cheques allowing simple reconciliation of each Bank a/c. Similar reconciliation of credit card a/cs can be achieved.

The program caters for transfers between accounts (e.g. from Bank to Building Society a/c or from Bank to Credit card a/c etc) the relevant details being input only once.

The program also allows for standing orders to be set up on any single account or between any two accounts. These are paid simply by inputting a date up to which the payment of all orders should be recorded. The necessary debits and credits are then created and the date of each order is reset. Orders can be for any multiple of calendar months.

The program is fully menu driven and all areas of input are 'range protected'. As much guidance as possible is included in all screen displays and the user is always given the opportunity to abort a transaction.

Full amendment and deletion routines are provided; for individual transactions, for Standing orders and for budgets.

The main file can hold between 800 (all full length descriptions) and 1800 (no descriptions) transactions. The former should be sufficient for most people for at least one year and the index file size is set on this basis. A warning is flashed on the main menu when the main file reaches 750 transactions. Account balances may be carried forward to a new set of accounts.

All you will ever need in a home finance package and beautifully presented.

ONLY £12.95
Highly Recommended

Gemini VALUE!

With over four years experience of providing practical software solutions for business and home applications, Gemini have put together a selected range of famous titles for the BBC and BBC Plus in TWO special packs, at VERY SPECIAL prices. These super value packs contain all the serious application software you're ever likely to need for your BBC, from spreadsheet and database management to a complete professional business accounting system. Gemini's 'OFFICE MATE' and 'OFFICE MASTER' packs are here – put that computer to WORK!



• DATABASE • BEEBCALC SPREADSHEET • BEEBPLOT GRAPHICS • WORD PROCESSOR • FULL DOCUMENTATION

DATABASE

Use this program for storing all types of information just the way YOU want to store it. You set up a computerised 'card index' system and add records and data to the file in the format that you choose.

Advanced features include sorting and searching for specific records, mathematical calculations, printer routines, data summaries etc. If you don't have a database, you certainly should!

BEEBCALC SPREADSHEET

Perhaps the most commercially successful item of business software yet written, the Gemini Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If say, the cash receipts for January need to be changed, it would normally be necessary to delete and recalculate several figures for each successive month.

With BEEBCALC, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulae cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs. BEEBCALC has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Of course, full printer facilities are included which allow for either the table to be printed or just the data and formulae relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. BEEBCALC's sister program, BEEBPLOT will take data from disk or tape files created by BEEBCALC to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT Graphics

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs ... for easier visual comparison and assimilation.

BEEBPLOT also incorporates a built-in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Beebcalc and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

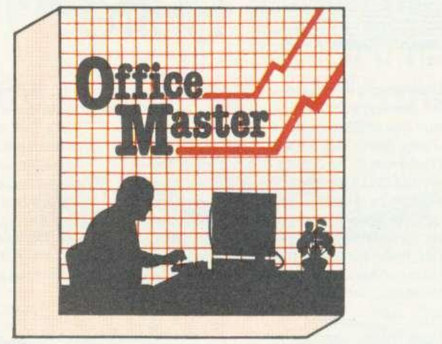
WORD PROCESSOR

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include: block delete, block insert, search and replace, edit text, display text, and many more.

Step up to Office Mate and save money! (Price if purchased individually - £79.80 – save £67.80 with this pack) Electron version available, pack contains Database, Beebplot, Beebcalc, Home Accounts, Cassette only.

OFFICE MATE £12 Cassette or Disk



• CASH BOOK • FINAL ACCOUNTS • MAILIST • EASILEDGER • INVOICES & STATEMENTS • STOCK CONTROL • FULL DOCUMENTATION

CASH BOOK

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cash book system and will provide you with a computerised system complete to trial balance.

Simple to use, this program will replace your manual cash and bank records and provide vital management information at any time. It will take you from sheaves of invoices and cheque book stubs to trial balance, and may, if desired, be used in conjunction with the Final Account program.

Typical information from CASHBOOK is as follows: **1.** Summary of VAT information to enable completion of VAT returns. **2.** Cumulative receipts and payments report analysed over the standard profit and loss and balance sheet headings. **3.** Option for departmental analysis of sales and purchases. **4.** Printout of all transactions, nominal account balances etc. **5.** Journal routine for entering transfers between accounts and year end adjustment for debtors, creditors, etc. **6.** Trial balance. **7.** Full audit trail facility.

This program is recommended not only for businessmen, but also for practising Accountants for use in the preparation of Accounts from incomplete records; a printer is essential.

FINAL ACCOUNTS

Requires Gemini 'CASHBOOK' module (except Commodore 64 version)

This program will take data prepared by your Gemini Cashbook module and produce a complete set of accounts for you in the following format: **1.** Trial Balance with inbuilt rounding routine. **2.** Notes to the Accounts. **3.** VAT summary. **4.** Profit and Loss Account with comparatives facility. **5.** Balance Sheet with comparatives.

All reports may be produced at any time interval comparing actual to budget if required.

MAIL LIST

Gemini's Mailist program will enable you to keep a record of names and addresses and then print, examine, sort and find themn, all with special selection techniques. All our mailists contain our exclusive 'SEARCHKEY' system, giving you the option of creating your own dedicated coding system for each name on file. For example, on most mailing list systems, you are only given the standard heading such as name, street, town, country, postcode etc. With the Gemini searchkey system, you could find, say, all names on the file that are companies having a turnover in excess of '50,000' or all names that are subscribers who are behind in their subscriptions or all names that are eligible for a Christmas card this year!

A full and useful range of routines is included in the menu, and the program allows you to set up your own format for printing labels, i.e. the tab settings you require and spaces between labels, etc. Multiple copies can also be printed.

EASILEDGER

Contains routines to enable the small business man to keep a record of one of the most important aspects of his business – cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided, as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both Easiledger and Cashbook programs together.

INVOICES & STATEMENTS

The Gemini INVSTAT program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as 'Please remit by return', 'Overdue and outstanding', etc.

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the INVSTAT program produces professionally formatted documents using your own printer.

STOCK CONTROL

You have a stock of products. With the Gemini program you may enter details of each product on to a record card on the computer with details of your own existing part number (if any), a description of the product, the unit quantity (i.e. one, a gross, a pair, etc.), the cost price per unit, the selling price per unit, a specified minimum satisfactory stock level, units in stock ordering quantity and supplier details.

The program will allow you to enter stock received, stock out, and will also give you a summary of stock items and current holding, together with details of total cost of stock, total sales value of stock, current gross margin on stock, cost of bringing stock up to minimum level, understocked items, etc.

Each stock item has its own computerised record and you may browse through the file as a whole, or just a specified number of records. An extremely powerful program, highly recommended for inventory control in small and medium sized businesses.

OFFICE MASTER £25 Cassette or Disk

Gemini INTEGRATED ACCOUNTS & HARDWARE

WHY INTEGRATED ACCOUNTING?

Because it will retrieve information stored in one program for use by another, and store data in one program which has been generated by another.

This means that the scope for human transposition error is virtually eliminated ... for example, when typing an invoice manually, the typist could type £14.25 instead of £41.25, and undercharge the customer. Such an error cannot occur with integrated, computerised invoice generation, since only the part number needs to be entered and the price (and product description), are taken AUTOMATICALLY from the Stock Control program, and printed AUTOMATICALLY onto the Invoice.

Likewise a Stock Controller, operating a manual system, could transpose the quantity sold, when posting from a copy invoice, and deduct 93 pcs from the Stock card, instead of 39. This would understate the book stock by 54 pcs, and possibly cause the product to be re-ordered, and consequently overstocked. Again, this could not happen with an integrated system, since the quantity invoiced is AUTOMATICALLY deducted from stock, due to integration of the Invoicing and Stock Control programs.

WHY THE BBC MICRO?

Because, although originally designed as an educational computer, it has the facilities needed for serious business use. In particular, speed of operation ... although only an 8 bit machine, it has a faster operating speed than many 16 bit micros. By gearing a suite of Integrated Accounting programs to the BBC Micro, Gemini have produced a combination of excellence which will eclipse any other computerised business system in its price bracket ... and many other systems in much higher price ranges.

WHY GEMINI?

Because our business software for the BBC Micro is based upon the solid foundation of experience.

We have successfully written business software for the BBC Micro since it was first launched.

Your choice of software for a computerised business system is critical ... badly written programs could bring your business nearer to ruin, more quickly than almost any other investment. The fine reputation of Gemini, evidenced by the Independent press comments listed below, are your guarantee of confidence in the professional experience which back this major investment in the efficiency of your business.

INTRODUCTION

Designed for the small to medium sized business user, where speed and efficiency are vital, Gemini Integrated programs are suitable for sole traders, partnerships, or limited companies. All require a BBC B 32K microcomputer, and an 80 column printer. A double disk drive with an Acorn compatible DFS is required for integrated accounting purposes. A single disk drive may be sufficient where modules are used independently, although this is not recommended for the Sales Ledger and Invoicing module. The manuals indicate the system capacities for various disk drive combinations.

The programs have been devised by H.C.C.S Ltd in the light of substantial mainframe computing experience, and share many of the features normally found only in very large installations. Used in a typical business environment where invoicing, sales ledger posting, stock control adjustment and nominal ledger posting is simultaneously made, the software will convert the BBC micro into a business computer of enormous power, directly comparable with hardware/software combinations costing many times its price.

Each program is supported by a comprehensive, easily followed manual, and 'user friendly' screen prompts with error trapping routines, which make a specialised knowledge of accountancy unnecessary for the average user. All the programs, however, have many sophisticated features which make the programs revolutionary for the home micro market.

Gemini Marketing Limited confidently recommend the programs to serious commercial owners of the BBC B micro as software capable of making an enormous contribution to business efficiency and profitability at minimal cost, since it requires no expensive second processor in order to achieve the advantages of integrated accounting.

NEW LOW PRICE Price **£69.95** per Module



Includes 1 year software support

INDEPENDENT PRESS COMMENTS

John Vogler reporting in December 1984 edition of 'A & B Computing' said of Gemini Integrated Accounting when comparing to Peartree, Micro Aid, Software for All, Acornsoft Mirle and Sage:–

"This is the newest and most exciting. To have achieved a substantial degree of integration, very rapid file access and respectably large file sizes, without the use of a second processor, is a fine achievement. As one would expect from GEMINI, the individual modules are eminently professional and for the first time present the single processor BBC as a viable small business computer ... GEMINI have produced a superb product ... superb examples of the programmer's art."

INVOICING & SALES LEDGER

The Gemini Sales Ledger and Invoicing program will produce invoices and statements for customers and enable a tight control over credit procedures to be maintained by producing aged debtors reports, and by keeping current information concerning customer accounts.

The module can be used independently or interfaced with the Gemini Nominal Ledger and Stock Control modules, and offers the following advantages: • Maintains open-item sales ledger. • Comprehensive customer Master File maintained in memory. • Choice of fixed and free format invoices. • Integrates with Gemini Nominal Ledger and Stock Control modules. • Prints invoices, invoice copies, statements and credit notes. • Reports include: Aged Debtors, Sales Daybook Sales analysis by user defined code, VAT analysis, Audit trail giving copy details of all transactions. • Automatic updating of sales ledger. • Comprehensive accounting controls including period end close down routines and full audit trail for all transactions. • Examine customer status by file enquiry to screen or printer showing year to date activity. • Trade and settlement discount terms definable for each customer. • Caters for up to 5 rates of VAT. • Can hold up to 135 customers on 40 track disk system and up to 610 customers on a 80 track disc per Sales Ledger file. • Comprehensive analysis of invoices over unlimited, user definable sales codes. **Price £69.95.**

PURCHASE LEDGER

Used independently or interfaced with the Gemini Nominal Ledger, the program maintains a complete file for each supplier, records amounts outstanding at any time, helps to determine which invoices are payable, and payment dates for the claiming of discounts. Among this module's many features are the following: • Automatic posting of suppliers' invoices to Purchase Ledger. • Comprehensive analysis of invoices over unlimited, user definable expense headings. • Comprehensive accounting controls including period end close down routines with posting reports, and full audit trail facilities at appropriate stages of processing. • Full integration with Gemini Nominal Ledger module. • Purchase invoices and credit notes easily processed. • Supplier file held in memory, with full details of each supplier. • Maintains open item purchase Ledger. • Management of invoices due for payment within cash restraints. • Maximum number of suppliers on 40 track disk system of 135 and maximum of 610 suppliers on 80 track disk system per Purchase Ledger file. **Price £69.96**

NOMINAL LEDGER

This is the central module of the Integrated Accounting system and may also be used independently as a Cash Book or interfaced with the Sales and Purchase Ledgers and payroll programs. It includes the following main features: • 143 Nominal accounts all of which are user-definable. • Posting of transactions from Sales and Purchase Ledgers and Payroll modules. • Full Cash Book facilities. • Print out of full Trading and Profit and Loss Account and Balance Sheet together with notes to the accounts. • Full accounts may be produced for whatever period chosen by the user. • Comprehensive accounting controls including period end close down routines and complete audit trail for all transactions. • Journal feature for adjustments between accounts and correction of book-keeping errors. • Reports include: Account Master File showing complete code listing. Cash Book entry details. Journal printouts. Trial Balance. Trading and Profit and Loss Account with notes. Balance Sheet with notes. Audit Trail Enquiry for all accounts. • Account enquiry showing movements over the period under review including opening balance, period end adjustments and closing balance. • Account posting masks allow conversion of analysis codes set up in other modules into selected user-defined Nominal Ledger codes. **Price £69.95**

PAYROLL

This program provides a full range of controls over the different aspects of Payroll Accounting icluding tax and other deductions. It can be used independently, or interfaced with the Gemini Nominal Ledger, and offers the following facilities: • Employee file maintained in memory, containig: Name, address, sex, marital status, National Insurance Number and contribution type, date of birth, personnel number, department, date employment commenced, all applicable tax codes, whether week 1 or month 1 applicable, hourly or salaried, pay cycle, payment type (cash, cheque or direct transfer), PAYE reference number, previous name, bank details. • Supports weekly, fortnightly, four weekly or monthly employees. • Company master file containing: Name, address, bank account number and name, bank name and branch, PAYE reference. • Produces cash analysis of note and coinage to suit requirements. • Employee pay details include: Gross pay and tax paid to date both current and previous employer. National Insurance contribution for employer and employee. Five rates of overtime per employee. Up to 12 standard and 5 non-standard pay elements per employee. Basic pay. Hourly rate. • Reports include: Payroll reconciliation, Payslips, Coinage analysis, Cheque and bank giro list, Payroll masterfile, Departmental analysis. • Relevant data to complete Inland Revenue forms including: P11, P35, P45, P14/P60. • Maximum 98 employees on 40 track disk system and 198 employees on 80 track system per Payroll file. **Price £69.95**

STOCK CONTROL

A program providing full control over every aspect of stockholding operations which can be interfaced with the Gemini Sales Ledger and Invoicing program, this module includes the following features and routines: • Inventory Master File holding details of part number, selling and cost price, sales and product code, current stock, location of stock, allocated items, re-order level, quantity on order, current period activity and supplier code. • Permits four types of transactions – sales, returns, receipts and adjustments. • Part enquiry routines for any stock item. • Reports include: Part catalogue, giving stock sales and cost values. Re-order report. Evaluation stocks list, giving stock sales and cost values. Dormant parts report. Delete parts report. Stock usage report. Stocktaking sheet. Stock audit report sorted into part sequence and transaction type and date. • Screen prompt when item falls below the minimum re-order level. • Directly interfaces with Sales Ledger to enable automatic generation of product details for invoice production and adjustment of stock records. • Maximum 980 part numbers on 40 track disk and 1980 on 80 track disk per stock file. **Price £69.96**

Gemini Midi Maxi Offices, sole distributors to the trade –

CentreSoft Ltd

Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham, B7 4LY. Tel: 021 359 3020. (Mail order to Gemini).

Special Hardware/Software OFFERS

Having arranged bulk hardware purchasing discounts, Gemini is now able to offer complete systems of hardware and software offering unequalled value for money. We offer a choice of hardware only or hardware with software as follows:–

DEAL 1

BBC SYSTEM comprising:–

- BBC 32K with DFS
- 40/80 switchable 800K double disk drive
- 80 column printer
- 12" screen monitor (for colour add £150 to system price)
- All connecting cables

OUR PRICE INC. VAT £999.95

MS-DOS version soon.

Please enquire by telephone for prices of individual hardware items.

DEAL 2

DEAL 1 with the addition of the following:–

- 'DDD' Integrated database, spreadsheet and graphics
- DataGem database ROM
- Integrated Accounts – ALL 5 MODULES
- Mail Merge utility for Integrated Accounts
- 'Video Classroom' programming educational video (VHS only)
- 'Life & Business Organiser' ROM
- 'Maxi Office' software pack
- 1 pack each pre-printed stationery; payslips, statements, remittance advice, invoices for use with integrated suite, plus one box 2000 sheets listing paper.

USUAL PRICE £1650 – OUR PRICE INC. VAT £1395

If not ordering by telephone, please use this order form to order any item on this page, or three preceeding pages. Please state your requirements clearly, and whether you require 40 or 80 track format when ordering disks. Please allow 7 days for delivery.

24 hour CREDIT CARD HOTLINE – AMEX/ACCESS only – 0395-265165

All stated prices include VAT and post/packing.

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Cheque/POs value £________ enclosed, or please debit my Access/Amex no.________

Signature______________________________

Export/Trade enquiries and Local Authority POs welcome.

AU

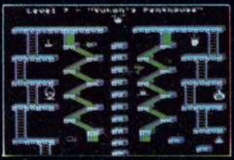
BOUNTY BOB STRIKES BACK!

Twenty-five Levels.

Multi Channel Music.

Dual Joystick Capability.

"Bounty Bob Strikes Back" is the sequel to "Miner 2049er" which was a huge success on the Commodore 64 and Atari machines. Now on the Amstrad, this version features Bob's toughest challenge to date and he needs your help more than ever before to guide him through the mine. The mutant organisms within have multiplied and over run the mine entirely, making it extremely difficult to survive the hazards of the underground passageways. Using high powered special equipment in the twenty-five caverns is Bob's only hope of achieving his objective of securing the mine and defeating the evil plans of Yukon Yohan.



BEACH-HEAD

Multiscreen 3-D Arcade Action

A peaceful island is being held by a ruthless dictator and his troops. As Chief Commander of land and sea forces in the Pacific, you must obtain a quick naval victory and then invade the island with land forces. If your troops succeed in penetrating the island defence systems, the most difficult challenge still remains; capturing the enemy fortress of Khun-Lin.

Beach-Head is a multiscreen action game which requires different skills and provides new sequences as you progress through the game.



BRUCE LEE

Twenty secret chambers to explore

Unique multiple player options

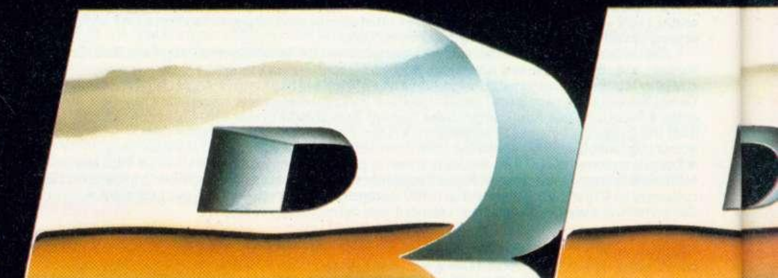
Dazzling graphics and animation

In "Bruce Lee" you will experience the power and the glory of Bruce Lee, one of the greatest masters of the martial arts.

As Bruce Lee, you will confront a barrage of vicious foes. You must penetrate the fortress of the Evil Wizard and claim his fortunes. Destroying the Wizard will earn you immortality and infinite wealth!



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Master ET	**£373.75**
Master 512 Upgrade	**T.B.A.**
Master 5c Upgrade	**T.B.A.**
Eprom Cartridge (2EF)	**£14.95**
BBC Model B + 64K	**£396.00**
BBC Model B + 64K with Econet	**£425.50**
BBC Model B + 128K	**£414.00**
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CDX 800S (800K) 2 x 80 Track Double Sided Drive Excl. PSU	**£179.40**
CS 400 (400K) 1 x 80 Track Double Sided Drive Incl. PSU	**£125.35**
CD 800S (800K) 2 x 80 Track Double Sided Drive Incl. PSU	**£212.75**
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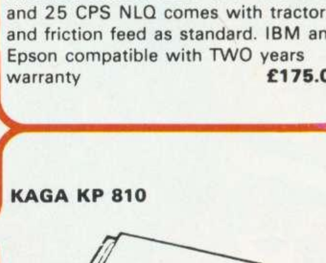
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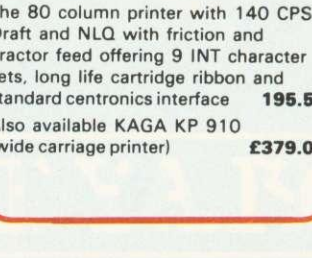
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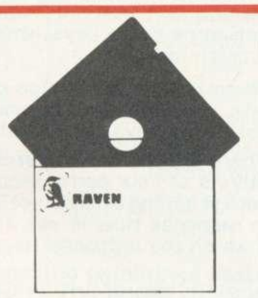
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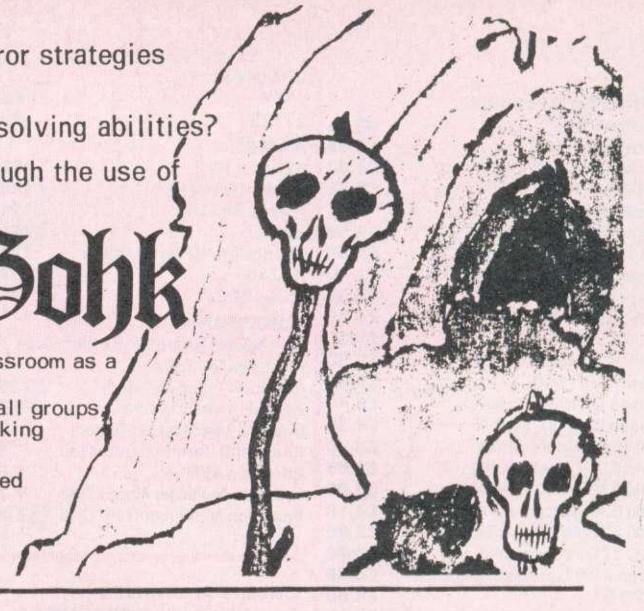
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The program is lavishly illustrated in Mode 7 graphics and packed with problems, puzzles and decisions, set in three chapters to help the organisation of groups and comes complete with a resources book giving a synopsis, suggestions, etc. etc.

Available on disk only at £12.50

Don't struggle with your keyboard, make it easy with

MICROTYPE

The ultimate typing tutor–now upgraded for the BBC

Recognised as the standard in typing tutors since it was introduced to microcomputers some three years ago, the Kansas Microtype has been still further improved and converted to the BBC Micro.

So you have a Beeb! Which means you, and most likely those around you are going to spend a fair bit of time at the keyboard. Not only now, but for many years to come, as computers are most certainly here to stay.

So why not master the keyboard now? Stop chugging away with just a few fingers and your eyes for ever on the keys –learn to touch type.

Microytpe will allow you to teach yourself, and will improve as you improve. Just a few short sessions and you will see results. Keep at it for say half an hour a day and you will be 'touch' typing within a week–with no need to have to look at the keys ever again! Keep at it, and speed will follow.

Apart from simple working instructions and a finger position chart, everythng is actually shown on the screen––you don't have to wade through a printed course. You will be given the characters to type on the screen and will be shown which are being keyed in correctly and which are not.

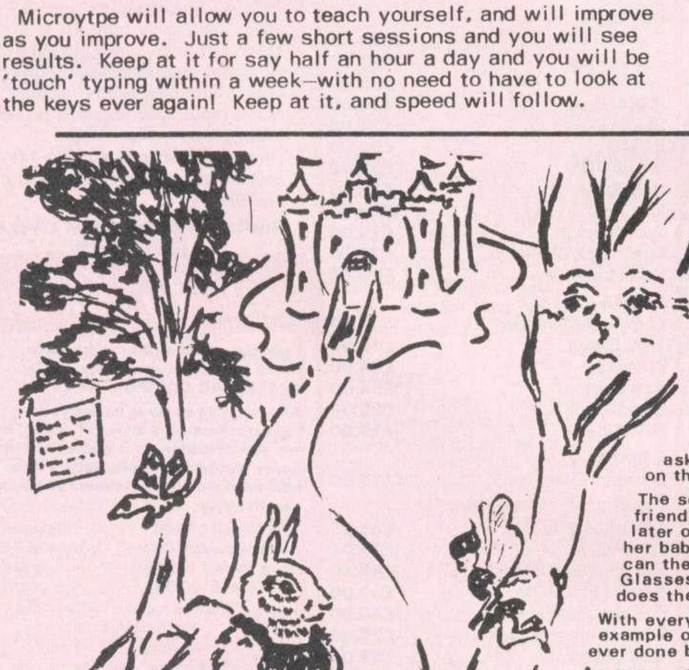
At the start you will be given the 'home' keys to practice, but unlike normal typing tutors, the computer can compute on which keys you are inaccurate or slow and so can give more practice on these keys, whilst replacing those on which you are proficient.

There is also the choice of either practice mode or paragraph mode. So once the program has given, and you have learned, most of the keys, paragraphs can be attempted.

There are ten short exercises in each lesson, with a complete alalysis of your performance at the end. This includes your average typing speed, accuracy and the keys mis-keyed. If the response time is set, the program will also show the keys on which the response time was exceeded.

Used by training officers and others by North Western Electricity Board; British Gas; British Telecom; British Petroleum; Post Office; National Coal Board; Esso; Boots; I.C.I and numerous colleges and schools, all wishing to master the art of touch typing.

New lower price £9.95 tape. £11.50 disk



For the children alone...

Magic Adventure

In Magic Adventure, Beth and David Guest have created a wonderland journey for children between four and eight.

Simple in operation, using the User Defined Keys, it nevertheless uses the BBC to its full with colourful pictures and wonderful story.

As the child brings up the locations, a simple question is asked, with the adventure proceeding in different way depending on the response.

The scenes include the Talking Tree–who played a nasty trick on a friend so was punished by the Fairy. But if the Talking Tree helps later on, all with be forgiven...Poor mother rabbit needs help to count her babies...Dare the Cage be opened...what is in the Grassy Field... can the King's Spell Jar be found...what is the real colour of the Glasses...will the fairies dance......is the Castle locked...where does the Path lead...will the Fairy come...will there be a surprise...

With everything illustrated in colourful graphics, this is a delightful example of the programmers' art and refreshingly different from anything ever done before. Sound of course.

As scene upon scene enfolds, the children will be more and more entranced as they go on their Magic Adventure...

Now used in over 300 infant schools throughout the country, and played and loved by children everywhere.

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SOLIDISK FOUR MEG BOARDS MAKE THE BBC MICRO ONE OF THE FASTEST MACHINES YOU CAN BUY

Fit your BBC micro with a Solidisk Four Meg board, and run the PCW BASIC benchmarks in 7.13 seconds, and the PCW Spreadsheet benchmark (with Inter-Sheet) at 312 cells/second.

If you are serious about your business throughput or your "Elite" status, check the effect of Solidisk Four Meg boards. They use a totally new concept for expanding your BBC micro, both in RAM/ROM capacity and in speed.

The newer ROMs have more capacity, 32k as used in the BBC Plus and 64k as in the Communicator. They are also faster and consume far less power than the older 16k and 8k ROMs.

There are four high-capacity Sideways ROM sockets on a Solidisk Four Meg board. You can use a 64k chip in one of them and 32k chips in the other three. Together with the four ROM sockets on the BBC motherboard, you can then fit up to 224k of Sideways ROM into your BBC computer.

Sideways RAM and Shadow RAM haven't been forgotten. The Solidisk Four Meg board can have them too. You can choose either zero or 32k of RAM. The latter can be used either as Shadow RAM or as two banks of Sideways RAM.

Thus, the Solidisk Four Meg boards offer more capacity and yet occupy less space than other boards offering only Sideways ROM/RAM expansion.

In addition, the new Solidisk 256k board offers the Four Meg feature, together with up to eight banks of Shadow RAM and eight banks of Sideways RAM.

But the real plus feature is speed. The Solidisk Four Meg boards make the BBC micro outstandingly fast.

They have a switchable 2 or 4 MegaHertz superfast CMOS 6502 processor. At 4 MHz, the machine can produce up to twice the throughput of a standard BBC B, BBC Plus 64k or BBC Plus 128k. Witness the PCW BASIC and Spreadsheet benchmarks.

Compared with a standard IBM-PC (17.6 sec) and a standard BBC micro (14.6 sec), a Solidisk Four Meg board enables the BBC to run the BASIC benchmark in just 7.13 seconds, putting it amongst the fastest micros that you can buy today.

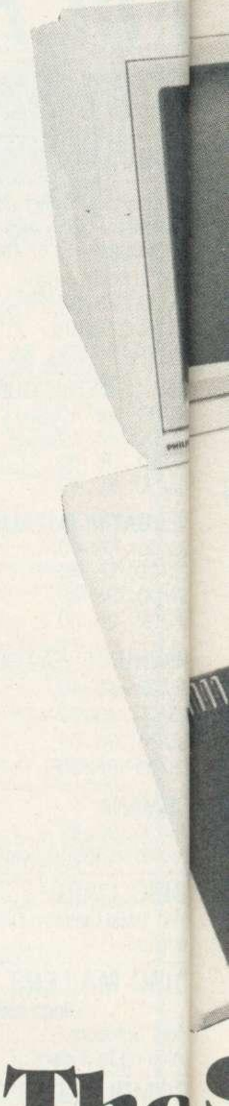
It is comfortably ahead of a BBC with the Acorn 6502 Second Processor (9.58 sec), and only marginally slower than an IBM-PC AT (TM) (7.11 sec) and a BBC with the Acorn 32016 Cambridge Co-Processor (6.88 sec).

Using Computer Concepts Intersheet to run the Spreadsheet benchmark for speed of recalculation, the Solidisk Four Meg boards enable the BBC to achieve the highest published score amongst microcomputers: it can recalculate more than 24 rows × 13 columns per second (312 cells/sec) by comparison with LOTUS 1-2-3 (89 cells/sec.) or even SYMPHONY (TM) on the IBM-PC (97 cells/sec).

Besides serious applications, the Solidisk Four Meg boards are simply great for computer games. You should just see the stunning graphics and response at 4MHz to realise how good your BBC Micro is. If you don't believe us,

Just try Acornsoft's Elite or Revs with it!

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The basic Four Meg boar costs £30.00 inclusive of VAT.

The 32k version comes with software in ROM and on 5 diskettes, and costs £69.00 inclusive of VAT.

The Solidisk Four Meg boards are intended for the BBC Model B only and can be used with existing Solidisk Sideways RAM boards. However, they are not compatible with any other Sideways RAM/ROM boards, or Shadow RAM boards — which they can replace.

The Solidisk Four Meg boards are securely mounted on the original processor socket, and the additional connections may be made either by sprung clips or by soldering.

The sideways ROMs and RAMs built onto the BBC motherboard are not switchable to 4 MHz.



Solidisk 256K Board

Largest and fastest in the range of memory upgrades for the BBC computer is the Solidisk 256k board. This has 256k of RAM, four high-capacity ROM sockets and a superfast 4 MHz 6502 processor. Both the 256k of RAM and the four ROM sockets can run either at 2, or at 4 MHz — twice the speed of the standard BBC B or the B Plus.
It comes with Wordwise Plus, the best-selling wordprocessor from Computer Concepts, and the Solidisk 32k Manager ROM. This latter can allocate the RAM between Shadow RAM, which acts like that on the BBC Plus, Sideways RAM, for holding images of ROM software, and a RAM disc, which can be of up to 200k.

The Hardware

The 256k RAM is divided into eight banks of 32k bytes, which can each be used as Sideways RAM or as Shadow RAM.
Shadow RAM is usually 20k, but may be increased to 30k, to enlarge the RAM available to the user — eg to hold a bigger document or worksheet.
Sideways RAM is usually 16k, but can be 31k to increase the amount of code held in a single bank. Software which occupies two ROM slots in a standard machine may now be re-written into a single ROM slot, thus becoming shorter in size and faster in operation.
If need be, each bank can be shared between the two, i.e. the bottom as Shadow and the top as Sideways RAM, the border line being controlled by the application software.
The four high-capacity ROM sockets on the 256k board can accept chips of any size from 8 to 64k. 32k chips can be configured either as 31k of continuous code or two independent levels of 16k; "resident" and "backup" (this latter being compatible with the BBC Plus). 64k chips can be divided similarly; one resident — again of either 16 or 31k — and the rest as backups.
The processor is switchable between 2 and 4 MHz. At 4 MHz, the machine can produce up to twice the throughput of a standard BBC B, or B Plus, 64 or 128k.

The Manager ROM

This enables the 256k RAM board to be used for VDU screen record/playback, printer/sound buffer, Basic variable storage, or as a RAM disk.
The Manager ROM also contains a toolkit of programming utilities to list variables, edit, find and exchange strings, check, move, salvage, expand, join and renumber programs, load, save and set function keys, report program status, turn cursor and sound on/off, set sound volume etc.
Shadow RAM may be selected by *SHADOW, followed by a mode change, or by FX114, 128 to FX114, 255, exactly as on the BBC B Plus. However on the latter, arguments 128 to 255 all select the same, single Shadow RAM bank, while on the Solidisk 256k board, they can select between up to 128 Shadow RAM banks (if they exist).
As with the earlier Solidisk SWR32, 64 and 128, a group of Sideways RAM banks can be used as a RAM DISC — now of up to 200k. RAM disc is set up by *RAMDISK <drive>. This stimulates a disc drive, now under not only the Solidisk 2.0 DFS but also — for the first time — ADFS. This operates faster than even the Solidisk Winchester.
The Manager ROM makes the 256k board even more versatile. RCAT displays both "resident" and "backup" firmware. Resident firmware includes all ROMs installed in the BBC motherboard, plus all Sideways RAM banks containing ROM images. The command SELECT causes code to be copied from a backup to a Sideways RAM bank, thus making it "resident".
These features provide potential for further developments in software for the BBC Micro — including integrated suites of business applications, such as Computer Concepts' "Inter-" family.

With the most useful RAM capacity, and the doubled speed, the Solidisk 256k board is perfect for the present, while having huge potential for the future.

Prices, inclusive of VAT

The 256k board comes with the Wordwise Plus ROM and manuals, and Solidisk Manager ROM and manual.

Outright	£175.00
Upgrade from SWR 32	£123.00
Upgrade from SWR 64	£89.00
Upgrade from SWR128	£75.00

The 256k boards are securely mounted on the original processor socket, and the additional connections may be made either by sprung clips or by soldering.

THE SOLIDISK - DISC SOLUTIONS

Solidisk can offer you the widest possible choice in hardware and in software. Our 1770 and 1770+8271 disc interfaces are of the finest design, and supported by excellent software. Solidisk DFS and ADFS are highly acclaimed by BBC experts. Our 80-track double-sided floppy disc and high-capacity Winchester drives are the fastest and have the lowest power consumption. The quality of support and the competence of our 90+Local Experts and technicians are unquestionable. So when you shop around, insist on the Solidisk label.

The Solidisk 1770 Disk Interface

The Solidisk 1770 Double Density Disk Interface enables the standard BBC B computer to use floppy disc drives. It has only four components, which are easily fitted by novice and expert alike.
The Solidisk 1770 Double-Density Disc Upgrade (Issue 2) is now fully compatible with the Acorn 1770 DNFS and the Acorn ADFS ROMs.

The Solidisk 1770+8271 Disc Interface

In order to enjoy double density operation, as well as retaining maximum software compatibility with older disc software (which only runs with the 8271), you can now fit the Solidisk 1770+8271 Disc Interface. You can select either the 8271 or the 1770 at a flick of a switch.
It is intended for the BBC Model B already fitted with an 8271 Disc Upgrade, and plugs into the 8271 socket, with the 8271 being transferred to the new board. The Solidisk 1770+8271 Disc Interface (Issue 2) is now fully compatible with the Acorn 1770 DNFS and the Acorn ADFS ROMs.

The Solidisk 2.0 Disc Filing System ROM

This ROM can be used with either 8271 or 1770 Disc Interfaces (Acorn or Solidisk). It has every facility that you would expect, such as disc formatter and verifier, automatic 40/80 track switching, single/double density sensing and programmable track stepping (to suit almost any type of disc drive).
Additional features and utilities include unlimited file catalogue, Read-After-Write (for higher reliability), text editor, memory editor, disc sector editor, whole disc copier, tape-to-disc, download, read and write a track and recover and restore sectors (for recovering corrupted discs).
Even when working with the 1770, it can run all Acornsoft games (such as Aviator, Elite, Revs, Magic Mushroom etc), and most other protected disks (such as Castle Quest, Island's Music System etc.).
It also has several advantages over the Acorn 1770 DNFS ROM including:
1) The option of double-density operation, which gives 60% more storage capacity, i.e. 640k on a double-sided 80-track diskette, as opposed to only 400k.
2) A better emulation of the older 8271 floppy disk controller: some protected disks (such as the early versions of Acornsoft's Elite game will not run with the Acorn 1770 DFS.

These features make the Solidisk 2.0 ROM the most versatile DFS software you can buy.

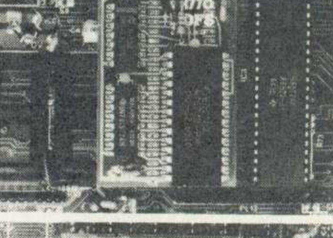
The Solidisk Advanced Disc Filing System ROM

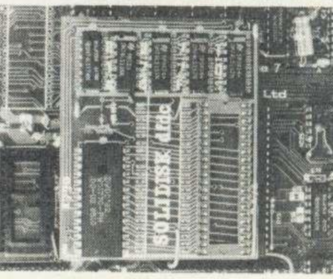
This ROM-set can be used on the BBC Plus and the BBC Model B fitted with a 1770 Disc Interface (Acorn or Solidisk). It is available as an upgrade for your existing DFS ROM in one 32k or two 16k ROMs.
The Solidisk ADFS was reviewed in A & B Computing, October 1985. Whilst comparable to the Acorn ADFS, it is designed for maximum DFS software compatibility (PAGE=& 1900 with one file open).
The Solidisk ADFS will run most software available for the BBC computer, including all Acornsoft languages and the View family and Computer Concepts Wordwise and the Inter-family.
Additional commands include OPEN <number of files> to reset PAGE appropriately, while MVDFS and MVADFS provide direct transfer of files between DFS and ADFS discs.
The Solidisk ADFS is equally convenient for use with floppy and hard discs.
Utilities such as FORM40, FORM80 (for single-sided drives), FORM160 (for double-sided, 80-track drives), VERIFY are provided for floppy discs, whilst BYE used on a hard disc makes a copy of the root directory, to assist recovery in the event of corruption.

The Advanced Disk Filing System (ADFS) is now officially launched by Acorn, and is already revolutionizing software for the BBC Micro. The Solidisk enhancements make it obviously preferable.

Prices, inclusive of VAT

2.0 DFS ROM and manual	£10.00
ADFS+DFS ROM set and manual	£20.00
Upgrade from 2.0 DFS to ADFS	£10.00
1770 Disc Interface, 2.0 DFS ROM and manual	£45.00
1770 Disc Interface, ADFS, DFS ROMs and manual	£55.00
1770+8271 Disc Interface, 2.0 DFS ROM and manual	£50.00
1770+8271 Disc Interface, ADFS, DFS ROMs and manual	£60.00







Solidisk Disc Drives

Solidisk 5.25 inch disc drives are of the latest half-height design, with 80 tracks and double-sided, giving a capacity of 1 Megabyte (unformatted).
Features such as automatic spin-up, steel band positioning and a new head mounting system ensure correct centering, consistent tracking performance and long service life of the disc.
The use of a direct-drive motor and the latest VLSI circuitry results in exceptionally low operating noise and power consumption. Therefore two such drives can be powered reliably by the BBC micro.
They are enclosed in strong steel casings, coloured in elegant beige, to protect the high-precision mechanism.
The power and data leads are fitted with appropriate connectors, to suit the BBC computer.
With each disk drive purchase, Solidisk provide five volumes of useful software, each on a separate diskette, and a User Manual.

Volume 1

Solidisk Word Processor and Spelling Checker, with English dictionary. You enter by *WP <filename>, and then start typing. Wordstar-like commands make it easier to use than Wordwise, View or Scribe. What you see on the screen is what will be printed. The most useful commands are displayed at the top of the 80 column screen. It provides on-screen justification, automatic margin, insert/overwrite, search and replace, word count, word frequency count, free space, *commands and page numbering. Block operations include move, delete, copy, print, load to cursor. The Solidisk Word Processor has the unusual ability to spellcheck your document without leaving it, simply by typing Control-U.

Volume 2

This contains the Solidisk Database. It uses an 80-column display, is completely menu-driven, can be easily customised and allows datafiles as large as the filing system permits.
You enter the database with Shift-Break, and select one of the 15 options, each leading to a sub-menu. Datafiles can have an unlimited number of records, each with up to 15 fields of up to 60 characters. You can search, sort, view, print using tabulation, print labels, print forms, edit and delete, calculate on fields, merge databases, mailmerge etc.

Volume 3

This contains the Solidisk spreadsheet. Also using 80-column display and menu-driven, it has options to create, edit, recalculate, and print etc. Spreadsheets can have unlimited numbers of rows and columns. Each column can be from 2 to 70 characters wide. All the BBC Basic maths functions are available.

Volume 4

This contains the Solidisk MACRO language. It is Control, TAPE to DISC. DZAP, MZAP and SILEXIGEN, a dictionary generator for the Solidisk Spelling Checker together with a sample French dictionary.

Volume 5

This contains the Solidisk MACRO langauge. It is capable of generating a Basic program using PROCEDUREs, FUNCTIONs, MACROs and machine code routines contained in other programs.
Using the Solidisk MACRO language, you can extract useful parts of existing programs to set up your own MACRO libraries, then use them later on as building blocks for new programs.

The Solidisk computer case

This compact steel case is coloured in beige and especially designed to hold the BBC micro and two Solidisk disc drives. It will support even a heavy-weight monitor, while providing good cooling for the power supply and concealing many connecting cables.
The keyboard is housed in a separate case, connected by a 24 inch flexible data cable. It is ½ inch lower than the original case, does not skid about on the desk and makes a lot of difference to typists (even two-fingered ones!).

Prices, inclusive of VAT

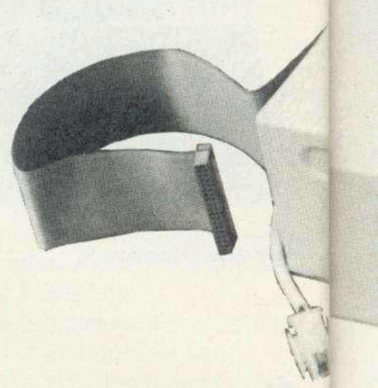
Solidisk 80-track, double-sided disc drive unit with software and manual £109.00
Dual 80-track, double-sided disc drive unit with computer and separate keyboard cases, software and manual £230.00
Computer and keyboard case alone .... £ 30.00

We reserve the right to change prices and specifications without prior notice.

A COMPLETE SOLUTION TO BUSINESS COMPUTING

Suitably equipped, your BBC Micro is an excellent computer for the office. It can run wordprocessor, database, spreadsheet etc better than many other business machines. It can also communicate with other micros and mainframe computers, either directly or via a MODEM.

Solidisk has selected the best in business software, disc drives and printers to form the Solidisk Office System, based upon the BBC Model B or the B Plus. With the Model B, a Four Meg board or a 256k expansion may be fitted along with a 1770 or a 1770+8271 disc interface. Both models can have a Winchester hard disc connected.



The Solidisk Wordprocessor, Disc Drive and Printer Package

The Wordprocessor is the famous WORDWISE PLUS — the best selling wordprocessor from Computer Concepts. Various reviewers speak of WORDWISE PLUS as very user friendly, flexible, straightforward or simply excellent (1). With it, you can write letters and longer documents, and change them to your satisfaction before printing. If you need many similar letters or standard forms, you need only write them once. Wordwise Plus can search and replace any word or phrase, and also mailmerge.

The 5.25 inch disc drive is of the latest half-height design, with 80-track double-sided, giving a net capacity of 640k bytes per disk (in double density). The diskettes are industry standard, readily available and low in cost. The power and data leads are fitted with appropriate connectors, to suit the BBC computer.

The printer is a 9-needle dot-matrix, with a speed of 160 characters per second in normal mode and 32 characters per second in Near Letter Quality mode. Features include multiple pitch settings, italics, boldface, underline, super and subscript, bit image graphics etc. It uses the same ribbon and control codes as the Epson FX85(2).

All manuals and accessories like printer ribbon, printer cable and paper, and a blank diskette are included, so that you can start right away. The package also contains a list of other selected software and hardware available from Solidisk.

Other possible applications

The Solidisk Office System can do more than just wordprocessing. To complement WORDWISE Plus, five volumes of useful software are provided, each on a separate diskette, including Spelling Checker, Database and Spreadsheet programs. You can use the database for mailing lists, customer records, stock inventories etc and the spreadsheet for cheque book balancing, budgeting and forecasting. The database is powerful enough to do important work such as processing all the Solidisk customer records (over 50,000).

However, you need not be limited to the bundled software, but can easily increase the power of the system with, eg a spreadsheet such as Inter-Sheet, a business graphics such as Inter-Chart, or a database such as Viewstore, for more demanding applications. With this last you can, for example, set up a datafile of 30,000 membership records of a video club and have any or even all fields indexed. You can then display them in sorted order, retrieve any record instantly with a few keystrokes, and have a report printed on most popular titles, age groups, takings etc. Such a large database requires a disc drive of very high capacity which in practice is a Winchester disc. Even if your present needs are not as large as this, it is nice to know that this system can grow tith you.

(1) See reviews in E & CM, CEEFAX, Acorn User.
(2) Solidisk own direct imports from Japan, subject to change without notice for improvements.

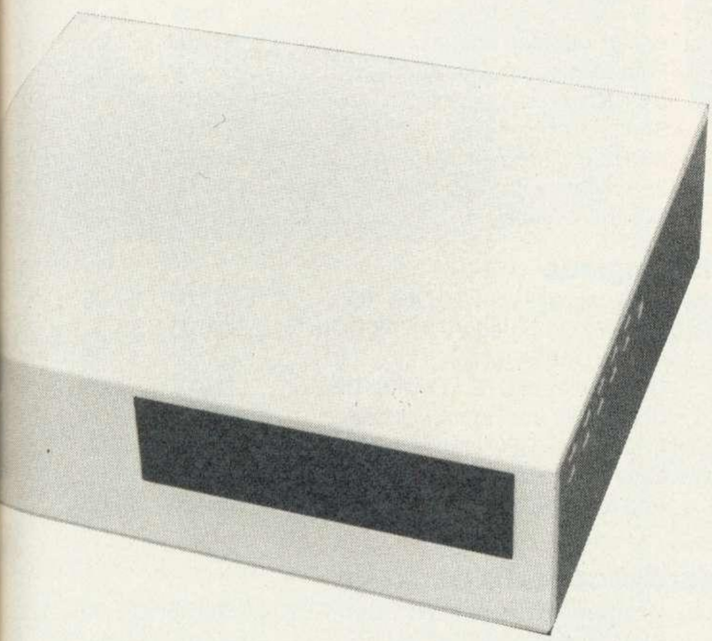
Prices

The Wordprocessor, disc drive and printer package i available for the BBC mode B Plus or the Model B fitte with disk interface. This includes:

- WORDWISE PLUS RO keystrip and manuals.
- one double-sided 80-track disc drive.
- one 160 cps printer.
- five software diskettes and manuals.
- all leads, blank diskette and 100 sheets of fanfo paper.
- one year guarantee.

The complete package costs £269.00 plus VAT.

Owners of BBC Model B's can purchase a Solidisk 1770 disc interface and a 2 DFS ROM, together with t above package, at a specia price of only £299.00 plus VAT (saving £10.00).



THE SOLIDISK WINCHESTER DISC DRIVE

The drive has a capacity of 20 Megabytes formatted. Both single- and dual-drive models are available.

Two key advantages of Winchesters over floppy discs are higher capacity and faster transfer rate.

Unlike floppy disc drives, Winchester drives are enclosed in sealed casings, allowing very high track density, up to 600 compared with 40 or 80.

Their discs are non-removeable, rotating continuously at high speed (3600 rpm), enabling data to be transferred 20 times faster than single-density floppy discs.

The Solidisk Winchester drive has a further advantage over some competitors. It has "buffered seek", hence stepping pulses can be as short as 2 microseconds. This results in an average access time of 80 milliseconds — less than one-hundredth of some other drives. This is especially important as the Winchester fills up, for example when used with a large database.

Hardware requirements

To use a Solidisk Winchester, you will need either a BBC Plus or a BBC model B, fitted with a 1770 Disc Interface (Acorn or Solidisk). The Winchester drive is connected to the 1MHz bus socket.

Software compatibility

The Solidisk Winchester drive is normally used under the Solidisk ADFS, which allows file sizes up to 512 Megabytes and provides a hierarchical directory, permitting an essentially unlimited number of files.

The Solidisk ADFS will run most software available for the BBC computer including all Acornsoft languages and the View family, and Computer Concept Wordwise and the Inter-family. In particular, ViewStore is well suited for databases on Solidisk Winchesters.

All the Acorn Second Processors (6502, 32016 and Z80) are largely compatible with Solidisk Winchesters. Applications such as System ADE running on the 6502, PANOS on the 32016, BBC Basic (Z80) and CP/M (with new HD ROM and HD BIOS) on the Z80 are compatible.

However, software that is not compatible with ADFS will not run.

Prices

The Solidisk Winchester packages consist of:

- One or two Winchester drives, enclosed in a steel casing. The drives come already formatted and loaded with the Solidisk "Initial Software" package, containing a collection of useful programs, such as CATALL, EXALL, ARCHIVE etc.
- A utility disc containing the SAFE program which allows recovery of a corrupted disc.
- A Solidisk ADFS+DFS ROM-set.
- A set of manuals.

Three models are available:

1) 20 Megabytes without its own power supply, but uses that of the BBC Micro ....£575.00+VAT
2) 20 Megabytes with its own power supply ....£650.00+VAT
3) Dual 20 Megabytes with its own power supply .£999.00+VAT

The minimum model is only suitable for use with BBC computers fitted with the current, switched-mode power supply and one Solidisk low power floppy disc drive.

BBC MASTER SERIES



AMB15	BBC MASTER Foundation computer 128K	£435 (a)
AMB12	BBC MASTER Econet computer 128K (only ANFS)	£348 (a)
AMC06	Turbo (65C102) Expansion Module	£87 (b)
AMC03	32016 Expansion Module with 0.5Mb RAM	£POA (b)
ADF13	Rom Cartridge	£13 (d)

BBC PLUS COMPUTER RANGE

BBC B PLUS with DFS..........£369 (a)
BBC B PLUS with 128K..........£389 (a)
BBC B PLUS Econet (No DFS)..........£360 (a)
BBC B PLUS Econet & DFS..........£399 (a)
BBC Dust Cover..........£4.50 (d)

UPGRADE KITS

Acorn DFS Kit..........£80 (d) 1.2 OS ROM.....£7.50 (d)
Econet Kit..........£55 (d) DNFS ROM.....£17.50 (d)
BASIC II ROM with User Guide..........£22.50 (d)
1770 DFS Upgrade for Model B..........£43.50 (d)
ADFS ROM (for B with 1770 DFS & B plus)..........£26 (d)
64K Upgrade Kit for B plus £35 (d)

ECONET ACCESSORIES

Econet Starter Kit.........£85 (b)
Econet Socket Set.........£34 (c) Printer Server Rom.......£41 (d)
File Server Level I.........£75 (d) 10 Station Lead set........£26 (c)
File Server Level II......£210 (d) Adv. Econet User Guide.£10 (d)

ACORN 32016 CO-PROCESSOR

Acorn Cambridge Co-processor combines with the BBC micro to provide full 32 bit processing. The National Semiconductor 32016 processor performs all language and application processing, the NS32081 floating point processor maximises the performance and provides support for IEEE standard fp handling.

The specially developed operating system PANOS, provides efficient interfacing between the languages and the hardware and software of the BBC micro incl. the variety of ACORN filing systems: DFS, ADFS and NFS. PANOS provides a variety of utilities including a full screen editor and a linker providing acces to both library routines and cross language linking.

FORTRAN 77, PASCAL and C languages with mainframe type implementations, fully compiled and provided with appropriate library support are included. Other languages include, Cambridge LISP with its compiler, a 32016 assembler and a 32bit interpreted implementation of BBC BASIC with full screen editor. 1 Mbyte of RAM is included as standard.

32016 CO PROCESSOR (Currently available from stock) £1399 (a)
Please phone or write for full specifications on the Cambridge Co-processor and Cambridge Workstation.

ACORN WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III is installed as standard.

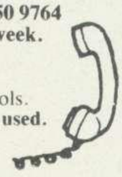
10 Mbyte Winchester £1350 (a)
30 Mbyte Winchester Drive £1999 (a)

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EPROMs/RAMS

2764-25......£2.00 (d) 27128-25......£2.75 (d)
6264LP-15.........£3.75 (d)

ACORN 2nd PROCESSORS

Acorn Z80 2nd Processor: Z80 CPU with 64K of RAM housed in a separate case with a integral power supply interfaces with the BBC computer through the TUBE. It converts the BBC into a CP/M system and its comprehensive package of software provides a suitable basis to set up a business system. **£329 (a)**

Acorn 6502 2nd Processor: This processor provides faster data processing speeds and larger memory. Particularly useful for use with Hi View word processor for production of large documents. **£169 (b)**

MULTIFORM Z80 2nd PROCESSOR

This processor converts your BBC into a power CP/M system and make it capable of operating in almost any CP/M format. Full details on page 5. **£299 (b)**

TORCH Z80 2nd PROCESSOR

ZEP100: This Z80 processor with 64K fits internally in the BBC computer and has the operating system in a ROM. It is supplied with the PERFECT suite of software comprising of a database, wordprocessor and a spreadsheet and a BBC BASIC for Z80.**£199 (a)**

ZDP240: ZEP100 with TORCH twin 400K Disc drive **£429 (a)**

ACORN TELETEXT ADAPTOR

This adaptor will convert the BBC computer into a teletext receiver capable of decoding and displaying the CEEFAX and ORACLE pages and the monitor screen. These pages can also be saved for later reference. BBC TV transmit educational software on their CEEFAX system which can be downloaded free of charge. **£125 (b)**

ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. **£278 (a)**

ROBOCOM BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 192 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value.

BITSTICK I **£305 (a)**

ROBOCOM BITSTICK II: This package is as Bitstick I with software upgraded to allow scaling and auto dimensioning. Multiplotter driver is also supplied with the package. **£775 (a)**

Upgrade for Bitstick I to II **£450 (b)**
Bitstick Multiplotter Driver (most popular plotters included) **£79 (b)**
Epson FX80 Screen dump routine for Bitstick I **£35 (d)**
Epson FX80 dump for Bitstick II **£39 (d)**

TECHNOMATIC

01-208 1177

BBC Computer & Econet Referral Centre

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London NW10 1ED
Tel: 01-208 1177
(close to Dollis Hill ⊖)

West End Branch
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(b) £2.50
(c) £1.50
(d) £1.00.

EPSON PRINTERS

The new range of high quality, robust dot matrix printers set the standard for the industry. A wide range of interfaces and the wide acceptance of EPSON control codes by software writers ensures compatibility with most computers and software.

EPSON LX-80 NLQ: A new low-cost high performance dot matrix printer from Epson. Its many features include Near Letter Quality, Draft mode, programmable characters, a variety of print styles, graphics etc. Supplied with friction feed as standard 100cps.

LX-80 **£195 (a)** Optional Tractor Feed **£20 (c)**

EPSON FX Range: This new range designed to meet virtually every type of computer based printing requirement, from correspondence quality (NLQ) text printing, a variety of fonts, to seven different levels of graphic printing. Fully IBM PC compatible with full graphics character set from the PC's keyboard. 8K built in buffer allows either data storage or creation of upto 240 characters of your own design. 160 cps for draft print and 32 cps for NLQ.

FX85 (80 col)..........**£315 (a)** FX105 (136 col)........**£449 (a)**

EPSON JX80 4 colour printer..............................**£435 (a)**

EPSON LQ Range: This range with 24 pin dot matrix printers offers a high, 200 cps, draft speed and superb correspondence quality print at 67 cps and truly high resolution graphics and a variety of fonts.

LQ800 (80 col) **£595 (a)** LQ1500 (136 col) 2K buffer **£875 (a)**
32K buffer **£950 (a)**

TAXAN KAGA PRINTERS

A set of economically priced printers that offers full EPSON compatibility and the near letter quality option and a facility to install 8K additional ram or 8K eprom for custom font. Both friction and tractor feeds as standard. 140 cps draft and 24 cps NLQ. A variety of fonts and graphics in six densities.

KP810 (80 col).........**£195 (a)** KP910 (156 col)........**£339 (a)**

DAISY WHEEL PRINTERS

BROTHER HR15: * 14 cps * 3K Buffer * Two colour printing * Proportional spacing * Underline * Bold * Shadow print * Super/Sub script + many other features.

BROTHER HR15 **£285 (a)**

JUKI 6100: * 15 cps * 2K Buffer * Switchable 10/12/15 cpi * Proportional printing * Linear Motor for max reliability.

JUKI 6100 **£279 (a)**

DOTPRINT PLUS

A versatile NLQ rom for all Epson compatible dot matrix printers

DotPrint is the first NLQ rom to provide comprehensive facilities to convert your printer into a sophisticated printing machine. Documents and reports can be given a truly professional look. Just compare the features shown below with any other NLQ roms currently available:

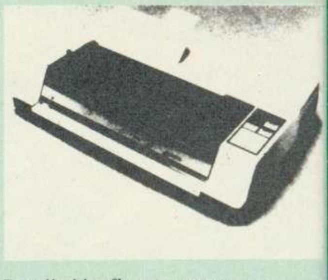
***Simple single word commands * Proportional Spacing**
*** Double width characters * Underlining * Bold print**

* Variable character pitch from 12 cpi to 10 cpi with increments of 1/240" per character. This allows upto 96 characters on 80 col printers. * Microspace justification (for disc users only). Very simple to use with Wordwise and Wordwise plus. Use of this facility is a little complex. * Using user defined fonts. * **Full UK/German/French/Spanish character sets.**

Full details plus sample prints available on request.

DOTPRINT + User Guide **£28 (d)**

EPSON HI-80 PLOTTER



EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer.

Detailed leaflet on request.

Epson Hi-80 Plotter £345 (a)

HITACHI 672 PLOTTER

Up to A3 on OHP film or paper with 4 colours. Its low inertia plotting system, which moves both the paper as well as the pens, gives high acceleration, and therefore high throughput, from a compact economical mechanism. Features both HP graphics language. Both parallel and RS232 interfaces as standard. Step size 0.1mm. **Hitachi 672 Plotter £465 (a)**

PRINTER BUFFER & SHARERS

BUFFALO 32K Buffer for EPSON PRINTERS: This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions.

Buffalo 32K Buffer **£75 (d)**

PRINTER SHARER/BUFFER: A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

TSB 64 Buffer/Sharer **£199 (a)**

A Serial Buffer/Sharer will soon be available. Please send for details.

PERIPHERAL & COMPUTER SHARERS

An extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 **£69 (c)**	25V25-3 **£64 (c)**
4 Computers to a Printer	36V36-4 **£85 (c)**	25V25-4 **£74 (c)**
2 Computers/2 Printers x-over	36V36-X **£69 (c)**	25V25-X **£69 (c)**
BBC Cable Set 3 to 1 (1m ea.)	**£32 (c)**	**£34 (c)**
BBC Cable Set 4 to 1 (1m ea.)	**£39 (c)**	**£41 (c)**

Computer Sharer:
1 computer to 2 printers fitted with Cable for BBC TCS26 **£19.50 (c)**

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces:

8143 RS232....................**£28 (d)** **8148** RS232 + 2K...........**£57 (d)**
8148T RS232 + 8K...........**£80 (d)** **8132** Apple II...................**£60 (d)**
8165 IEEE + Cable...**£65 (d)**
8177P NLQ for FX80+/FX100+..............................**£99 (d)**
8190S NLQ for FX80+/FX100+..............................**£64 (d)**
Parallel & Serial Buffers of various size also available.

FX80/80+/85 Tractor Attachment..........................**£37 (c)**
FX80/80+ Paper Roll Holder...................................**£17 (c)**
LX80 Tractor Feed..**£20 (c)**

SHEET FEEDERS:
8338 LX80.......................**£49 (b)** **8331** FX80+/85..................**£99 (b)**
8333 FX100+/105...**£169 (a)**

Ribbons:
RX/FX80/80+, FX85.........**£5 (d)** RX/FX100/100+, FX105....**£10 (d)**
LX80...**£6 (d)**
HI80 Pen Set (Aqueous/Ball point)................................**£7.50 (d)**

Dust Covers:
FX80..........................**£5.50 (d)** FX100.........................**£7.50 (d)**
TAXAN/Canon KP810............**£6 (d)**..............KP910...................**£7 (d)**

TAXAN KAGA/CANON Accessories:
RS232 +2K buffer...........**£78 (d)** Ribbon..................................**£6 (d)**

JUKI 6100
RS232 Interface................**£65 (d)** Spare Daisy Wheel..............**£14 (d)**
Ribbon (Carbon)............**£2.50 (d)** Sheet Feeder....................**£182 (a)**
Tractor Feed..**£129 (a)**

BROTHER HR15
Ribbon (Carbon/Nylon)...**£4.50 (d)** Red Correction Ribbon.....**£2.50 (d)**
Daisy Wheel.....................**£18 (d)** Sheet Feeder....................**£189 (a)**
Tractor Feed..**£99 (a)**

Printer Leads:
BBC Parallel Lead (1.2m).....**£7 (d)** BBC Serial Lead (1.2m).........**£7 (d)**
Other lengths can be supplied on order.
IBM Parallel Lead (2m)..**£12 (d)**

PAPER & LABELS
Plain Fanfold paper with micro perforations:
2000 sheets 9½" × 11"...**£13 (b)**
2000 sheets 14½" × 11"...**£18.50 (£4.50)**

Labels/1000:
Single Row 3½" × 1 7/16' **£5.25 (d)** Triple Row 2 7/16" × 1 7/16".**£5 (d)**

MONITORS

COLOUR

RGB MONITORS *(all monitors supplied with a BBC lead)*

1431 14" RGB Std Res	452 × 585 pixels	**£185 (a)**
1451 14" RGB Med Res	653 × 585 pixels	**£240 (a)**
1441 14" RGB Hi Res	895 × 585 pixels	**£375 (a)**

MICROVITEC 14" RGB/PAL/Audio

1431AP 14" Std Res	452 × 585 pixels	**£205 (a)**
1451AP 14" Std Res	653 × 585 pixels	**£275 (a)**

The above monitors are available in plastic or metal case.

MICROVITEC 20" RGB/PAL/Audio
2030CS 20" Std Res **£380 (a)** **2040CS** 20" Hi Res **£685 (a)**

TAXAN KAGA 12" RGB:
Super Vision III + with amber/green option **£345 (a)**

MITSUBISHI 14" RGB:
XC1404CB 14" Med Res BBC/IBM compatible **£229 (a)**

MONOCHROME

KAGA
KX12016 12" HI-RES green etched screen **£99 (a)**
KX1203A 12" HI-RES amber etched screen **£105 (a)**

SANYO
DM8112CX 12" HI-RES green screen **£95 (a)**

PHILIPS
BM7502 12" HI-RES green screen **£75 (a)**
BM7522 12" HI-RES amber screen **£79 (a)**

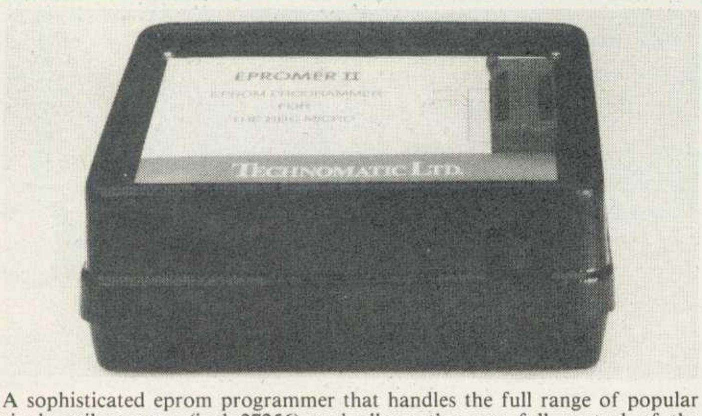
MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors) **£20 (c)**
Kaga Swivel Base for mono monitors with integral clock **£22 (c)**
Philips Swivel Base **£14 (c)** Monitor Plinth **£13.50 (c)**
Double Tier Plinth for flat drive, computer and monitor **£19.50 (c)**
Kaga RGB Cable **£5 (d)**
Microvitec RGB Cable **£3.50 (d)**
Monochrome BNC/PHONO Cable **£3.50 (d)**

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software.
Touchtec 501 **£260 (b)**

EPROMER II



A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.
Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

* Integral power supply ensures no power drain from the computer.
* Interfaces through 1 MHz bus, fully buffered.
* Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
* Eproms upto 16K (27128) programmed in single pass.
* Selectable programming voltage 25/21/12.5V
* Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
* User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
* Full screen editor with HEX/ASCII input.
* Data input from keyboard/Tape/Disc/Eprom.
* Software interface for integration of user's special requirements.
* Constant display of all options selected.
* Several BBC BASIC programs can be entered on a single eprom.
* Checksum facility allows for easy identification of programmed roms.
* Enter OS Commands from within the epromer program.

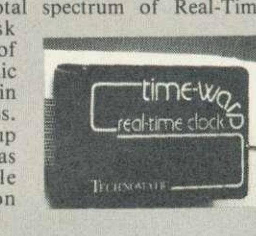
EPROMER II with Manual & Software on disc **£99 (b)**
ROM based software **£10**

UV ERASERS

UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. **£59 (b)**
UV1B as above but without the timer. **£47 (b)**

REAL-TIME CLOCK CALENDER

A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. **£29 (c)**



ROM/RAM EXPANSION SYSTEMS

ARIES B-32 BOARD: Features 32K of RAM and a 16K ROM socket. RAM can be configured as 20K or 16K as shadow RAM and 12K or 16K or 32K sideways RAM. New commands include comprehensive sideways ROM/RAM management system, simplified direct access to screen RAM and the ability to move/swap the contents of any area of memory. ROM/RAM management system allows RAM allocation, list ROMs, load sideways RAM, disable ROMs, and extend any buffer including printer buffer.

AIRES B32 RAM BOARD **£79 (d)**
ARIES B12 ROM BOARD **£40 (d)**
ARIES B12C Adaptor Board for B12 **£7.50 (d)**

ATPL SIDEWISE ROM EXPANSION BOARD A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board **£37 (d)** Battery Backup Kit **£18 (d).**

ATPL Board for BBC PLUS 10 × 16K ROMs **£29 (d)**

COMPUTER VILLAGE CV-16 Rom Board **£38 (d)**

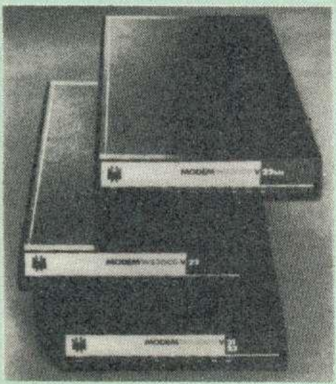
RAMROM-15 The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. **£79 (b)**

(Above boards are for use with standard BBC computer and not compatible with B plus unless specifically mentioned)

COMMUNICATIONS

MIRACLE WS3000 Range: * A new, professional series of intelligent modems with full auto dial and auto answer facilities as standard. * HAYES protocols are implemented allowing the use of a wide range of well proven communications software. 'Plain English' command structure simplifies the use of the modem even for the first time user. * All models feature a centronics compatible printer port allowing direct output to a printer. * A line sharing facility that allows WS3000 to differentiate between calls intended for data, and those for speech. * An intelligent speed buffered RS232 port and a wide range of available data rates makes this one of the most powerful multi speed range of modems available. * Line noise filtering ensures error free transmission and reception of data on long or noisy lines. * Internal battery backup allows storage of 63 names and telephone nos. * This range of modems can be factory fitted with high security data access protection system. * Models V2123 and V22 can be factory upgraded to V22bis standard giving a single compact modem capable of data rates from 75bps to 2400bps.

WS3000 V21/23: This modem complies with the CCITT V21, V23 and Bell 103 standards and operates at CCITT standards for 300bps, 75/1200bps, 1200/75bps full duplex, 600bps and 1200bps half duplex, and the Bell standard for 300bps full duplex. **£295 (b)**



WS3000 V22: This modem operates on all V2123 standards plus V22 standard for 1200bps full duplex V22bis standard. **£495 (b)**

WS3000 V22bis: This modem operates on all V21/23 and V22 standards plus 2400bps full duplex. **£650 (b)**

BBC Data Cable for WS3000 £6 (d) Data cables for other micros available.

MINOR MIRACLES WS2000 This highly successful world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. **WS2000 £125 (c)** **£7.**

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line **£30 (d).**
BBC User Port cable (for modem control) **£4 (d)**

SKI KIT (Allowing total control of the modem by your computer) **£10 (d)**

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling **£10 (d)**

GEC DATACHAT 1223 Modem: An economically priced BABT approved modem complying with CCITT V23 standard capable of operating at 1200/75bps and 75/1200bps and 1200/1200bps pseudo full duplex. It is line powered does not require external power source. It is supplied with software suitable for connecting to PRESTEL, Micronet 800, Telecom Gold and a host of bulletin boards. **£86 (b)**

WS2000 Auto-Answer Card £30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£22 (d)**

COMMUNICATIONS SOFTWARE

CONNECT-3000 AN ESSENTIAL UTILITY FOR THE WS3000 OWNER — a dedicated control package specially written to optimise the potential of the WS3000 series of modems. It provides a friendly menu-driven 'front-end', for the superb but rather complex multitude of facilities of the 3000 — no need to remember register nos. or complex command codings etc. It provides easy control for Prestel, Terminal, Auto-Answer/Dial use, while a unique 'default' facility provides automatic, pre-defined screen presentation. Works in conjunction with ALL communication software, including Commstar, Data-Beeb, Termulator, Termi, Communicator etc.
40/80 Disc **£16.50 (d)**

TERMULATOR An advanced terminal emulator on a 16K Rom. Emulations include VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. **£25 (d)**

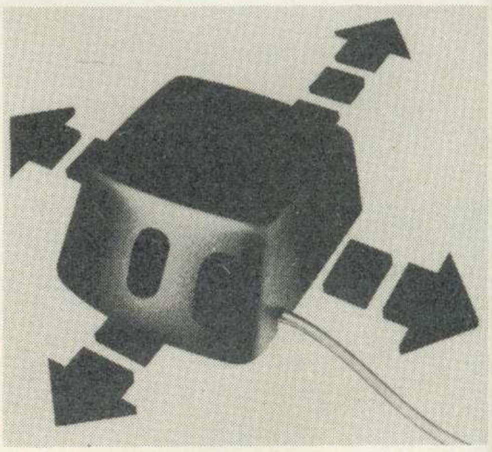
COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£49 (d)**
RS232 Solution (Book) **£15.95 (c)**

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£22 (d)**

COMMSTAR An ideal communications rom for both Prestel and bulletin boards. Facilities include Xmodem, clock etc. **£28 (d)**

DS1 Disc (for WS2000): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling. Not required with Data-Beeb. **£10 (d)**

AMX MOUSE with SUPERART



The mouse will now be available with enhanced software, the 'SUPER ART' which is compatible with 6502 2nd processor, the ARIES RAM board, BBC+ shadow mode, tape and ACORN DFS and ADFS. Allows full use of colour in mode 1. Disc users can create colour pictures in A4 size with dot resolution by scrolling the screen window. Other facilities include, colour pattern editing, use of icons, additional text styles, superb zoom in colour.
There is a variety of optional software to make the mouse one of the most versatile peripherals that can be added to the BBC micro.

AMX Mouse with Super Art **£67 (d)**
AMX Super Art Package on its own **£43 (d)**
AMX PAGEMAKER provides a high resolution A4 Typesetting and Artwork system. **£47 (d)**
AMX 3D ZICON will let you transform three dimensional vector data and translate them into 3D on screen graphics. **£21 (d)**
AMX DATABASE is a new filing system with 1000 records per file and unlimited number of fields per record. **£21 (d)**
AMXXAM This program enables you to create multiple choice exam papers which can include pictures created on ART, building the finished pictures into quiz etc. **£21 (d)**
AMX Original ART + Utilities package **£11.50 (d)**
AMX DESK **£21 (d)**

RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.

RB-21 (with 'icon artmaster'). **£52 (b)**

TECHNOMATIC

FIRMWARE AND SOFTWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE An exciting, powerful database with many features: Display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte! Maximum record size 60K. **£44 (d)**

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. **£59 (d)**

MASTERFILE II The new version of the popular general purpose file management system allowing large amounts of information to be stored and processed. It allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. This latest version features many new facilities including use with WORDWISE/VIEW **£17.00 (d)** Disc (80 or 40T).

WORD-PROCESSORS

VIEW Acorn's version V2.1 word processor rom. **£44 (c)**

VIEW VERSION V3.O Also compatible with BBC + Complete with Printer Driver Generator. **£69 (c)**

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. **£36 (c)**

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. **£10 (d)**

VIEW PRINTER DRIVER GENERATOR: This driver generator will enable you to produce a driver to suit your printer and also let you view the text as it will appear on the paper including condensed, italics, sub and super script modes. **£10 (d)**

VIEWSPELL: A rom based spelling checking utility with a dictionary of 70,000 words on disc. Additional/specialised dictionaries can be created. Facility to search the dictionary for words beginning with or ending with certain characters. **£52 (d)**

WORDWISE **£28 (d)**

WORDWISE PLUS The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. **£47 (d)**

WORDEASE A rom based utility for the Wordwise plus. **£24.50 (d)**

SPELLCHECK III A 16K rom based program for View and Wordwise plus. Contains 2000 words on the rom and 6000 (expandable to 17000) on disc. **£31 (d)**

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. **£44 (d)**

VIEWPLOT: A disc based Linear graph/barchart/piechart plotting program. **£25 (d)**

INTERSHEET The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. **£52 (c)**

INTERCHART Graphics Package for the Intersheet. **£32 (d)**

ULTRACALC **£49 (d)** **QUICKCALC** **£14.50 (d)**

LANGUAGES

META-ASSEMBLER: Both an editor and Macro-Assembler. Meta can assemble most 65xx, 68xx, 6804, 6805/6305, 6809, 8048, 8080/8085, Z80, 1802 and more. (Free updates due very soon — 68000 series, 8088/8086, Z8000 etc.) Many advanced features including Macros, conditional assembly, Global/selective search etc. Includes 16K Eprom, disc, function key card, and comprehensive manual. Please phone for comprehensive leaflet. **Meta-Assembler £126 (c)**

ACORN P-SYSTEM A portable operating system supplied complete with USCD PASCAL and FORTRAN 77. **£259 (b)**

6502 DEVELOPMENT PACKAGE A Macro-Assembler with utilities for use with the 6502 2nd Processor. Enables the serious programmer to develop large programs in assembly language. **£39 (d)**

ACORN MICRO-PROLOG: The logic programming language seen as the language for programming in the future and used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more user friendly for new users. 16K Rom, manual and extension modules. **£69 (c)**

ISO-PASCAL Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. **£52 (a)**

ISO PASCAL Stand ALONE GENERATOR: Utility to convert programs produced using ISO PASCAL for stand alone applications. **£30 (d)**

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. **£49 (b)**

LOGOTRON logo **£56 (c)**

BCPL A full implementation of the BCPL compiler language consisting of the language of ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. **£49 (b)**

BCPL CALCULATIONS PACKAGE Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calcultion files, example files and a comprehensive user guide. **£17.30 (d)**

BCPL STAND ALONE GENERATOR **£40 (d)**

Acorn LISP Rom, Acorn FORTH Rom, Acorn COMAL, (each) £39 (d)

MICROTEXT A frame based authoring system from National Physical Laboratory for interactive computer tutoring. Disc based. **Disc £43 (c)**

G:FORTH An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. **£30 (d)**

OXFORD PASCAL A fast, compact P-Code compiler, that fully utilises BBC Graphics and sound, contains a powerful editor, and produces 'standalone' software. (Specify 40/80T) **£35 (c)**

UTILITIES

ACCELERATOR	**£49 (d)**		
ACORN BASIC EDITOR	**£24 (d)**		
BROM	**£28 (d)**	**SLEUTH**	**£24 (d)**
TOOLKIT plus	**£31 (d)**	**EXMON-II**	**£22 (d)**
HELP II	**£27 (d)**	**DISC DOCTOR**	**£26 (d)**
DISCMASTER	**£18 (d)**		
ACORN GRAPHICS ROM GXR	**£23 (d)** (specify BBC B or BBC B PLUS)		
COMPUTER CONCEPTS GRAPHICS ROM	**£22 (d)**		
PRINTMASTER	**£26 (d)**		
DUMPMASTER II 16K rom with dump routines and a variety of features for about 40 different printers.	**£26 (d)**		
FONTWISE	**£10 (d)**		
HERSHEY CHARACTER FONT GENERATOR	**£18 (d)**		
ICON MASTER	**£29 (d)**	**STAND ALONE MOUSE**	**£34 (d)**
BILLBOARD	**£18 (d)**	**STUDIO EIGHT**	**£19 (d)**
ACORN'S CREATIVE SOUND	**£15 (c)**	**CC SPEECH ROM**	**£28 (c)**
ACORN'S SPEECH PROCESSOR ROM	**£15 (d)**	**ROMIT**	**£29 (d)**
PROGRAM BUILDER	**£18 (d)**	**REPLICA III**	**£12 (d)**

When ordering software on disc please specify track format (40/80)

BOOKS

No VAT on books; Carriage (c)

LANGUAGES:

Acorn BCPL User Guide	£15.00
Acorn FORTH	£ 7.50
Acorn LISP	£ 7.50
S-PASCAL	£ 7.50
Acorn ISO Pascal Ref Manual	£12.50
Intro to COMAL	£10.00
Intro to LOGO	£ 7.50
Micro Prolog Ref Manual	£12.50
Creative Sound	£ 7.50
Introduction to Pascal	£16.50
Prog the Micro with Pascal	£ 8.50
The UNIX Book	£12.00

BBC MICRO BOOKS
BOOKS FOR BEGINNERS:

BBC User Guide Acorn	£15.00
BBC PLUS User Guide	£15.00
Drawing Your Own BBC Programs	£ 6.95
Introducing the BBC Micro	£ 4.50
Mathematical Programs in BB Basic	£ 7.95

PROGRAMMING/UTILITY BOOKS:

Advanced User Guide	£12.50
Adv BASIC Rom User Guide	£ 7.50
Advanced Prog Tech for BBC	£ 8.95
Applied Ass./Lang on the BBC	£ 9.95
BBC Micro Advanced Programming	£ 9.95
BBC Micro Sideways ROM's RAM's	£ 9.95
BBC Micro Sideways Roms B. Smith	£ 9.95
Guide to the BBC ROM	£ 9.95
Exploiting BBC BASIC	£ 6.95
Further Programming for BBC	£ 4.00
Programming the BBC	£ 6.50
Structured Programming	£ 6.50
Using BBC BASIC	£10.00
View 3.0 User Guide	£12.50
Viewstore	£12.50
Word Processing on BBC (Wordwise + Epson)	£ 5.25

SOUND & GRAPHICS:

Advanced Graphics with BBC	£ 6.00
BBC Graphics & Sound	£ 7.50
Creative Sound on the BBC	£ 9.95
Graphics on the BBC Micro	£ 6.00

DISC DRIVE SYSTEMS:

Advanced Disc User Guide	£14.95
BBC Micro Disc Companion	£ 7.95
Disc Book	£ 3.50
Disc Programming Techniques	£ 7.95
Disc Systems	£ 6.95

APPLICATIONS:

BBC Filing Systems & Databases	£ 7.95
Business Programming on BBC	£ 7.95
Business Applications on BBC	£ 7.95
DIY Robotics & Sensors	£ 6.95

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London NW10 1ED
Tel: 01-208 1177
(close to Dollis Hill ⊖)

West End Branch
305 Edgware Road
London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

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(c) £1.50
(d) £1.00.

HINTS & TIPS

Martin Phillips explains how a disc stores data, presents a disc editor for looking at sectors, and plays 'Find the Lady' in mode 7

GET ON THE RIGHT TRACK

Disc drives are now almost essential with the BBC computer. These days, many programs are written to take advantage of facilities offered only by disc. As well as the obvious advantages, a major factor in the popularity of disc drives is today's costs – prices have fallen by about two-thirds in the last two years. Discs are cheaper too: now they cost not much more than a blank cassette.

It is now possible to upgrade to disc for an all-in cost of under £150. There are several different options available: single density, double density, 40 or 80 track. For the average home user I would suggest that 40 track single sided is best – as it is the standard system, there should be few problems with incompatibility. However, if you have a little more available cash, then a switchable 40/80 drive is the system to go for.

When you buy a new box of discs, they are totally blank. Before they can be used they need to have invisible magnetic boundaries laid out on them for the information to be stored in. This is called formatting. Why are discs not already formatted when you buy them? Don't forget that there are other makes of computer as well as the BBC micro. Blank discs can be used on a variety of different computers, each of which will have its own method of storing information, so the discs would have to be supplied formatted to one of many standards. There are even different standards available for the BBC micro.

To format a disc you need a formatting program. This is often supplied with the disc drive, but some DFSs (Disc Filing Systems) have a formatter built in, as does the new ADFS from Acorn, which is fitted in the B+. This formatting program lays out a series of concentric magnetic tracks on the disc.

Depending on the type of disc drive, either 40 or 80 tracks can be laid out, and a different formatter is needed to cope with each. (It should be pointed out that the disc drive is also different – a 40 track disc drive will not format a disc to 80 tracks.) As 40 tracks is the more normal standard, I shall refer only to that for the sake of simplicity.

When a disc is formatted, 40 concentric tracks are laid out on the disc, each track being divided into 10 sectors. The outermost track is track 0, and the innermost is track 39. Each sector can hold 256 bytes of information, so a disc can hold 40 × 10 × 256 bytes, or 100k bytes of information (and 1k bytes is actually 1024 bytes, not 1000). A byte of information is a number in the range 0-255. This refers either to an ASCII code (see July 1985 Hints & Tips for details of ASCII codes), or to the code, usually called a token, for a Basic statement. By using these tokens, much memory space is saved. Each of the 256 locations in each sector of the disc has the value &E5 stored in it after formatting, except the first two sectors of the first track (track 0). These two sectors form the disc catalogue. It is in these sectors that information is kept about which programs are on the disc and where they are stored.

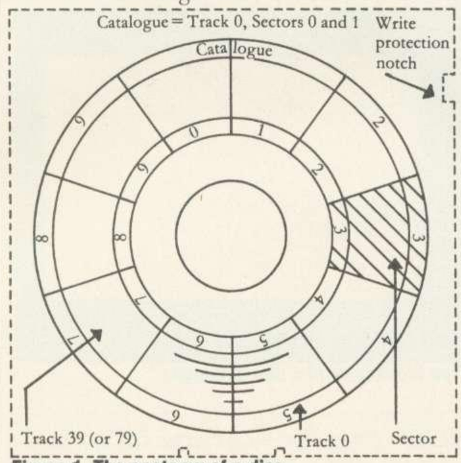


Figure 1. The anatomy of a disc

To understand better how a disc stores information, some means of looking at the disc sectors would be useful. This is where a disc sector editor comes in: this enables you to look at a sector, display its values on the screen, modify the values and then save them back to the disc (though you cannot load and save faulty sectors). There are several editors available, such as in Computer Concept's *Disc Doctor* and Watford's DFS. Alternatively, a disc sector editor is given on yellow page 105 and described later in this article.

First format a new or unwanted disc and use the editor to look at the first few sectors. Sectors 0 and 1 will show all zeros, except for locations 6 and 7 on the top line. These locations will show one of two numbers, either 3 followed by 20 (3 × 256 + 2 × 16 + 0 = 800) or 1 followed by 90 (1 × 256 + 9 × 16 + 0 = 400). By now you will have guessed that this represents the number of sectors on the disc. This number is actually used by the disc sector editor to stop a track number greater than the number of tracks on the disc being accessed.

You might expect all the other sectors to contain zeros. In fact they contain E5s. It is the first two sectors of track 0 which are special. These contain all the information for any programs stored on the disc (see table 1).

To see how this works, we'll need to save some short programs on disc. Switch the micro off at the mains and switch back on again. Save five short programs like this:

```
10 CLS
20 PRINT"This is program 1"
30 END
```

Call the programs PROG1 to PROG5 and change line 20 of each as appropriate. Now use the sector editor to examine the first few sectors. The catalogue sectors will contain information about the five programs, and the

Sector 00

&00 to &07	First 8 bytes of the 13 byte disc title
&08 to &0E	First file name
&0F	Directory of first file name
&10 to &1E	Second file name
&0F	Directory of second file name

and so on for the 31 files.

Sector 01

&00 to &03	Last 4 bytes of disc title
&04	Sequence number (which appears after the disc title and refers to the number of times the disc has been written to)
&05	The number of catalogue entries multiplied by 8
&06	(bits 0 and 1) The number of sectors on the disc; (bits 4 and 5) The start-up option (*OPT)
&07	Number of sectors on the disc (8 low bits of a 10 bit number)
&08on	Load address, execution address and file length of each file on the disc. This is the information given by the *INFO *.* call

Table 1. Contents of the first two sectors of a disc

following sectors will each contain one of the programs. Notice that each program starts on a new sector. This always happens. If the program is longer than one sector, it simply fills up as many sectors as needed.

What happens when a program is deleted, destroyed or wiped? These three commands are very similar in action. When a program is deleted, just the catalogue entry for that file is deleted, and the rest of the catalogue entries are shuffled up. After deleting PROG1, have another look at the first few sectors of the disc. This will show that the catalogue entry has indeed disappeared, but the program itself is still on the disc in the same sector. If you then save another program short enough to fit in the space, it will be saved into this space.

To actually shuffle up the rest of the programs to fill this space the *COMPACT command can be used. This physically moves all the programs on the disc so that there are no spare sectors between them. On a disc where there have been lots of programs added and then deleted, there can be a considerable amount of wasted space: *COMPACT will shuffle everything up so that all the free spaces come after the programs.

Using the disc sector editor and perhaps a couple of spare discs, you can investigate the action of several more disc commands. Try putting a title on the disc using *TITLE. The way a long title is stored is rather a bodge as you will see. Part of it is stored on sector 0, and part on sector 1. Try copying a few programs from one disc to another, and then compare this to *BACKUP.

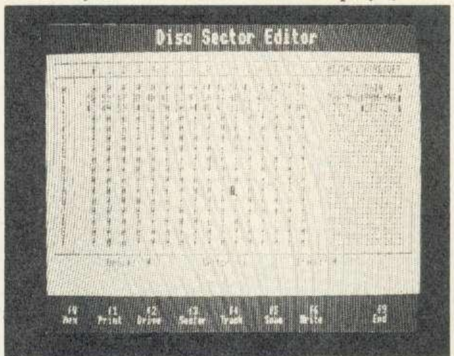
Try using *ACCESS to lock a file. The 'L' is stored straight after the filename in sector 0. what actually happens is that a locked file has a directory number &80 higher than an unlocked file of the same directory.

Try changing one character of a filename to a character greater than 128, catalogue the disc, and then try to load the program. Try changing byte 0 of sector 0 to &81 and catalogue the disc to see the effect. Now try changing that character to &15 and catalogue the disc again. Can the programs still be loaded?

WRITE TO THE EDITOR

The disc sector editor (see lising 1) will display the contents of a single disc sector on the screen. Any sector can be selected, as can different drives. A printout option is also included. It is also possible to scan a sector, pause, then read the next sector, then the next, and so on. The sequence can be stopped at any time by pressing the space bar. These various options are selected by using the function keys.

All the information stored on the disc (or in the computer's memory) is in a coded form. Each sector will store 256 bytes of information, where each byte is a number in the range 0-255. Sometimes this number is the ASCII code for a character, sometimes it is the token for a Basic keyword. So it is useful to not only display the actual number but also, where possible, the ASCII character. In order to get all the characters on the screen at once it is necessary to use an 80 column display (mode



The breakdown of a disc catalogue

0). This means that the program has to be kept quite short as memory space is at a premium. For this reason, meaningful variables have not generally been used. The main variables are:

C%: sector character
D%: drive number
G%: keyboard input ASCII code
M%: display type, ASCII or hex
S%: sector number
T%: track number
t%: number of tracks on disc
x%: horizontal screen position
y%: vertical screen position
p%: parameter block for sector read/write
data: memory page where sector values will be put.

PROCinit sets all the variables and defines the function keys. It also defines the screen colours. These are set to blue and cyan here, but any other colour combination can be used. (This is quite critical as in mode 0 some VDUs give much better results with certain colours than others.) Because of the shortage of memory, some memory blocks are given actual memory locations, so if you wish to use this with the second processor, you will have to dimension the memory blocks by using DIM.

PROCrun is the main run loop of the program. PROCscreen draws the screen display, making use of the double-height, double-width routine given in Hints & Tips, *AU* November 1985. Although only two colours can be used on the screen at any one time, different effects can be obtained by the use of inverse print. PROCdisplay prints out the contents of a sector in both hexadecimal format and in ASCII characters. PROCrev is a routine to print in reverse. PROCtype looks at the locations in memory where the contents of the disc sector were put and prints these on the screen. The parameter 'box' determines which of the two boxes the information is put into. Box 0 is the hexadecimal display, and box 1 is the ASCII display. Selecting box=2 will enable both boxes to be updated.

What happens to those numbers which are not directly convertible to ASCII codes? Numbers below 32, if converted to ASCII codes, can have an effect on the screen display so these must be filtered out. Codes above 127 cannot be converted to ASCII codes so these too have to be filtered out. Usually in such programs those codes outside the ASCII code range 32-127 are replaced by full stops, but this tends to be confusing, so instead rectangular blocks are displayed here. These are held in characters 128 and 129. Code 128 is a hollow block, and 129 is a solid block.

PROCinput is the routine to input a character from the keyboard, or to select one of the function key inputs. Once a character has been input which is not one of the function keys, then PROCupdate will alter the value on the screen and in memory. If the cursor is in the hexadecimal display, two digits must be entered. This can be confusing, as the program can appear to hang up.

PROCprint is the procedure to give a hard copy of the display. To be as compatible with as many printers as possible, and to work speedily, this is not an actual screen dump, but a text print. A hard copy is often useful when you experiment with a sector and perhaps want to return it to its previous state.

PROCdouble and PROCmc form the double-height, double-width routine, given in November's Hints & Tips. The assembly code routine is compressed to save some memory space. PROCrdsec is the heart of the program: it reads a sector of memory into a memory block in the computer. It uses the OSWORD call which requires a parameter block of information to be given first:

Byte 1: drive
Bytes 2-6: address
Byte 7: number of parameters
Byte 8: set to read
Byte 9: track number
Byte 10: sector number
Byte 11: read one sector

Once the OSWORD call has been made, any errors found will be reported in the following byte. Normally the DFS translates these to the error messages we have learned to fear. With

the sector editor, these are simply reported as 'Disc read error'. Similarly PROCwrsec reads a sector from the disc and stores it in the memory block pointed to by 'data'.

PROCdr, PROCsec and PROCtk are the input routines for the drive, sector and track. PROCtkno is the procedure to find how many sectors are on the disc. It can damage the disc drive if it is made to look for more tracks than the drive is capable of accessing. There is no way of determining this from the hardware, so we have to rely on the value stored on the disc. PROCscan is the routine to start the program scanning through the sectors.

PLAYING CARDS IN THE LIBRARY

It is often useful to hold a library of pictures or diagrams in memory – for instance for card games such as snap, word picture association, etc. The three problems which must be solved are: how to generate the pictures; how to store the pictures in memory efficiently; and how to display the correct picture without any discernible delay.

Such routines can take up a lot of memory and tend to be slow in operation. One way of doing this has been sent in by J Hurst and H Herberth from North Humberside, who earn £10 for their joint effort. Listing 2 demonstrates their approach to solving this problem, subject to the constraint that the mode 7 screen is not scrolled. The game is based on the old betting game of 'Find the Lady': three cards are displayed face down in random order and the player has to attempt to turn over the correct card, ie, the red ace.

The pictures may be either generated at the start of the program or *LOADed directly into the correct memory locations. In listing 2 the

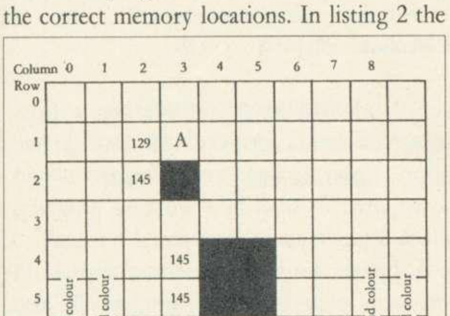


Figure 2. Picture based on a 10 × 10 matrix

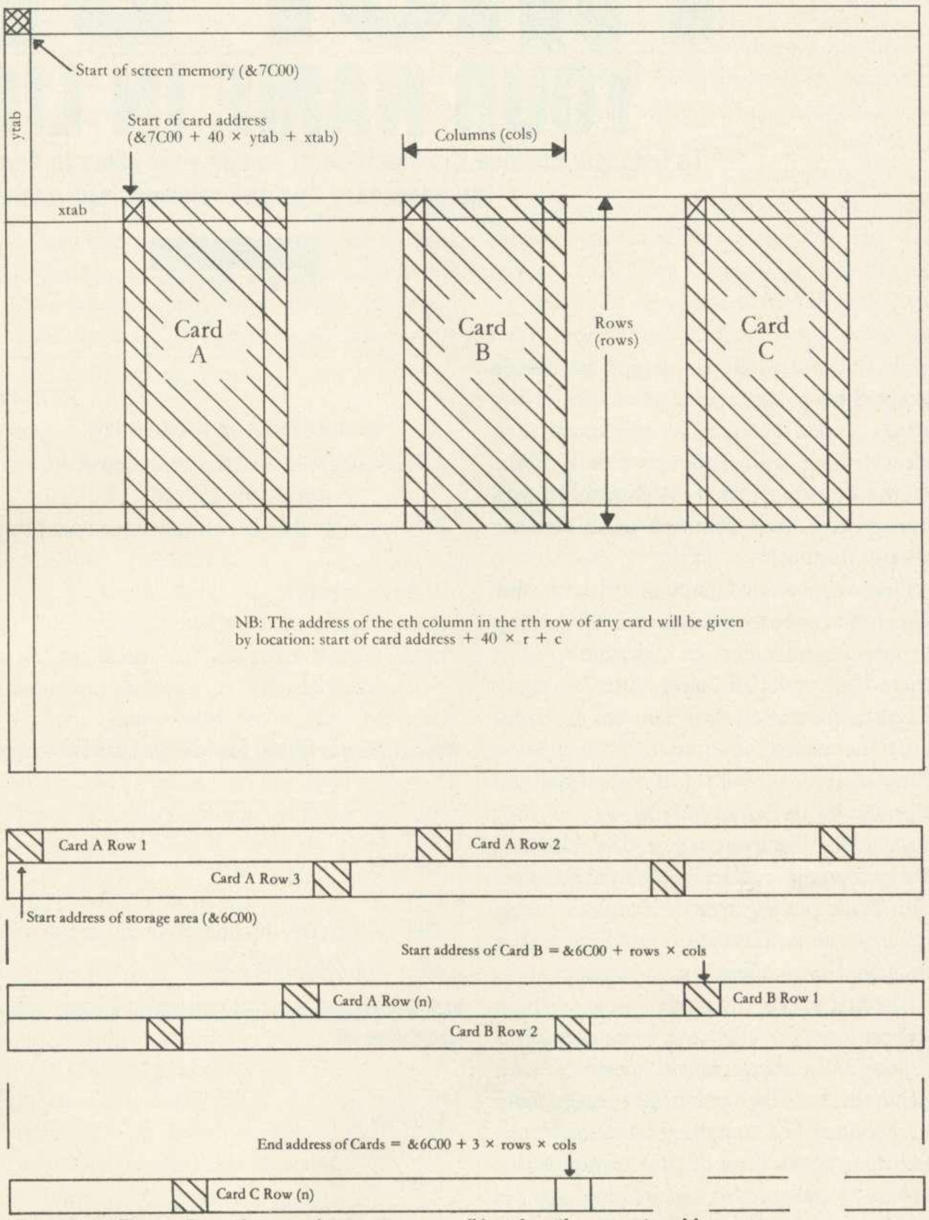


Figure 3. (a) The cards as they are drawn on screen; (b) and as they are stored in memory

pictures are generated within the program to demonstrate the technique used. All the pictures are based on a 10-row by 10-column matrix, although only eight columns will actually be displayed (see figure 2). The first two columns of each row define the background colour of the card and the last two columns restore the background colour to the screen setting. For the purpose of this game, three pictures are required: the red ace, a blank card and the reverse side of the cards. PROCcards generates these three pictures.

They are drawn on the screen as illustrated in figure 3. The width of the card is contained in the variable 'cols' and the height in the variable 'rows'. The space required to store each card is therefore: rows × cols bytes. To store a card, the assembly routine copies each card to a reserved picture area starting at address &6C00. On screen, the start address of each card is given by:

&7C00 + 40 × ytab = × tab

(see figure 3a) and the start of the storage address for any card is given by:

&6C00 + (card number – 1) × rows × cols

(see figure 3b). To display the correct card the start address of the card is given by:

&6C00 + (card number – 1) × rows × cols

and the screen position by:

&7C00 + 40 × ytab + × tab

The assembler routine copies the required number of bytes from the library area and stores them in screen memory.

After each row of bytes has been copied, the start of card address is increased by 40 to move to the next row.

The Hints and Tips listings can be found on yellow pages 105 to 109

FIRST BYTE

YOUR NAME IN LIGHTS

To help you achieve the ambition of seeing your name in Acorn User, we provide the necessary tips and relevant information

Tessie Revivis

How do you go about getting an article accepted for publication in *Acorn User*? Now there's a good question! So this month I've been chatting with Technical Editor Bruce Smith to put together some pointers to help you and the *Acorn User* staff work together towards that goal.

First, anyone can submit an article. In fact there is no doubt that without readers sending in programs and ideas on spec, the spice of *Acorn User* would disappear. Like any other magazine (or pub!), *Acorn User* has its 'regulars', the names you see each month on columns such as Joe's Jottings, Hints and Tips, the Acorn Forum and reviews.

One thing that many readers don't realise is that none of the regulars is employed by *Acorn User*. Many put together their articles during evenings and at weekends. The full time staff on *Acorn User* numbers just six people.

The first step in the article trail is to get an original idea. This may seem obvious but it is amazing how many articles come in each month that have been published already within the previous few months. For example, the first three *Acorn Users* of 1985 carried details on how to construct a database program. Yet for the rest of the year at least five database programs were submitted each month.

Equally, the idea must have a practical and useful application. Another popular submission is a program to convert between imperial and metric. This might be practical but is it really interesting and original? Quite honestly it's quicker and more effective to use a calculator. And, be honest, if we published such a program would you bother typing it in?

So what is an original idea? Well, let's look at some issues and see what's been sent in by readers and published. There's been *Super Painter*, an excellent combination of paint box and colour filling graphics; *Fonts*, using different style text on screen; *Elitism*, an *Elite* cheat as it were; *Maths in Motion* – in the words of Technical Assistant David Acton 'The best program ever published for the Beeb'.

If you have an idea, and also a friend who is Acorn orientated, try it out on him or her. You'll get an objective view.

POSTCARD

1. Interested: please send details and demo software ☐

2. Sorry, similar article already done/under way ☐

3. Any comments ....
....
....
....

Figure 1. How to lay out your stamped and self-addressed postcard or sealed envelope

```
TM 0
LM 8
LS 1
DH /Your Name/Article title/Page |P/
DF ///more.../
```

Figure 2. Standard dummy start file for articles written in View. Set default ruler to 60 characters and turn justification off

```
[LM8]
[LL60]
[EP]
[LS2]
[DH[CE] Your Name  Article title    Page : [PP]
[DF[CE] more...
[BP
```

Figure 3. Standard dummy start file for articles written in Wordwise. NB: [= f1] = f2

Let's suppose you come up with an idea that's new and original – what next? Surprisingly, Bruce Smith would not expect you to cobble it all together and send it straight in to him. On the contrary, Bruce says there are two possible avenues for you to pursue.

The simplest is to put a synopsis of your idea down on paper and send it in. Enclose with the synopsis a stamped addressed postcard marked as shown in figure 1. Once your idea has been read, Bruce can then tick the appropriate point on the card and return it straight away. This means you get an answer within a couple of weeks and it could save you a lot of work if a similar article is already in the pipeline.

Of course, an article cannot be commissioned on the strength of a synopsis from someone who has not written for the magazine before, so if your idea is appealing you would be required to send in a working program, which brings me on to the second approach.

As before, put your idea down on paper in the form of a synopsis. You should also provide a demo of the software on disc or tape, with step-by-step instructions for use and then send it in – no article at this stage.

The article is of course important, but it is also the most time-consuming part of the submission for most people. If your work is of interest and could merit publication we will then ask you to write the article – we would also give you an idea of how to approach the

subject and a list of points to cover – but more on this later.

The most important aspect at this stage now is presentation. A neat and tidy set of documentation stands a great deal more chance of reaching publication than a pile of shoddy, hastily scribbled-on scraps of paper.

Ideally, unless you have neat handwriting, your material should be typed or printed clearly. Remember what's needed:

1. Your name, address and phone number(s)
2. An outline of your proposal
3. A disc or tape clearly labelled with 1
4. A step-by-step guide for use
5. Return packaging and postage

Do remember that you're trying to sell *Acorn User* a product. Like any trader, you have to make it appealing and interesting. Item 4 is most important – you know how your program works, what it does and how to use it, but to the *Acorn User* staff it is brand new. So assume no knowledge at all and don't worry about making instructions too simple – in fact the simpler the better.

If you're submitting a program on disc then do use the !BOOT facility (see the disc user guide) to run the program. Again, many discs come into the office containing 10 or 20 files and no details on which one comes first!

It is also a good idea to include a list of the programs on the disc/tape with brief details on what each does. If programs are on tape, then ensure that side 2 contains a repeat suite of them all recorded at 300 baud.

Include practical demonstrations where possible. For example, if the submission is a graphics design program, include some designs put together using it – you're trying to sell the program, remember.

One bad habit that many readers are getting into is to send in just a disc or tape with a note to the effect 'letter/article on tape/disc'. Unfortunately we cannot accept submissions like this. Many of your ideas are pondered on train, boat and plane where only printed matter is available. Loading each text file into the appropriate wordprocessor and printing it out is also very time-consuming. So printed or written matter at all times please. When writing programs ensure they conform to the *Acorn User* standards. If they don't, we'll ask you to adapt them before accepting them for publication, which of course would just incur another delay. Full details on the *AU* program standards can be found in First Byte, September and October 1985 issues.

Assume no knowledge at all and don't worry about making instructions too simple

If your submission stimulates interest you will receive a letter or phone call from Bruce. He will then ask you to prepare an article, tell you what sort of things to cover, how long it should be and might also suggest some enhancements or follow-ups to include in your original program. At this stage it is likely that your program will be accepted. However, great care is needed now to prevent you having to re-write the whole thing.

Great care is needed now to prevent you having to re-write the whole thing

Ideally you should prepare your article on a wordprocessor or typewriter. In the former instance a printed copy is also desirable.

Tony Quinn, Bruce Smith, Kitty Milne and Julie Carman need space to edit your work. So your copy must be double line spaced. In *Wordwise* this is performed with the embedded command:

f1 LS2 f2

and in *View* the Edit command:

LS1

will do the trick. Wide margins are also needed for editing purposes. With *Wordwise* the two embedded commands:

f1 LM8 f1 LL60 f2

produce the desired effect. In *View* you will need to set the default ruler to an approximate width and use the Edit command:

LM8

to set the left margin.

Each page of your article should carry the following information at the top of the page: your name, the article title, and the page number. Also, if there is a following sheet write 'more' or it it is the last sheet write 'end'.

If you make reference to tables and or diagrams then make sure that they're all there – each on a separate piece of paper – that they are clearly labelled and have your name and address on them.

Normally *Acorn User* will arrange photographs of screens if necessary. However, if this is going to prove impractical for whatever reason, and you can supply pictures then they should be 35mm, or larger, transparencies or 5in by 7in black and white prints.

Make sure that you also keep a copy of everything you send. Things have gone astray in the post before now, and it also makes life easier should anybody need to speak to you about a particular point or item.

The other unanswered questions are how long, when published and how much.

Allow about six weeks for your submission to be processed. All submissions are acknowledged by card which is dispatched as soon as your article is received. This goes by second class post so may take a week to reach you.

Once an article has been accepted you will receive a written offer of acceptance. This will include the amount we are willing to pay for the full rights to your article. Payment is on publication, at which time you'll receive a cheque and early copy of the magazine.

It is impossible to give an exact date for publication. *Acorn User* is a very complex magazine to put together. In the words of Bruce Smith, 'Each issue takes at least six weeks to produce! Normally we work at least three months in advance.' As a rough guide, however, six months would be the quickest you could expect to see your name in print. Of course, it may be that your submission is not successful at this point and if this is the case then you will receive a letter to that effect, along with your returned submission. Unfortunately time does not permit either a personal reply or reasons why your article was not acceptable. Often there are many reasons and nine times out of 10 it was due to one of the points mentioned above.

Technical Editor Bruce Smith recalls his early writing career: 'On impulse I spent my wife's savings on an Atom. A few months later I submitted my first article to *Computing Today* – hand-written, including the long listing. Then *Acorn User* arrived and several of my Atom articles were accepted by Tony.

'Again these were all hand-written including listings – but I do have neat writing. Of course, from there I've gone on to be Technical Editor of the biggest user magazine in the country.

'Simon Williams is another lad who's come up through the ranks (January 1984). George Hill sent a printer article in (October 1982). Ultimately if the idea is good and the presentation is right a submission will shine through.

'Peter Sandford's dot colour fill pie and bar chart articles were magnificently prepared (January 1985). As soon as I picked them up I knew we'd use them.

'Harry Sinclair is a regular writer these days (September 1984). His original sprite designer sold itself straight away because he had put some superb demos together.'

The final line, therefore, is originality, thought and presentation. Over 3000 letters arrive at the *Acorn User* office each month. Many of these are ideas and submissions, so make sure that you put your time to good use and follow the rules – you'll stand a much better chance of getting into print!

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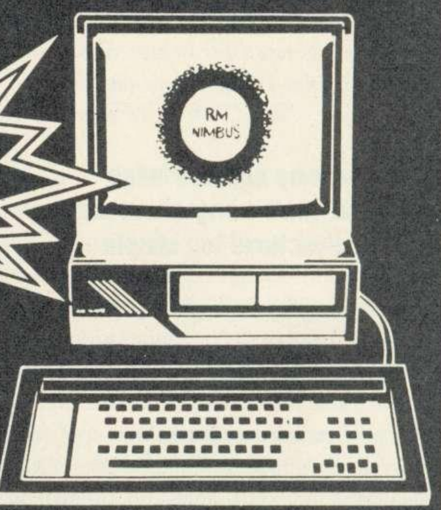
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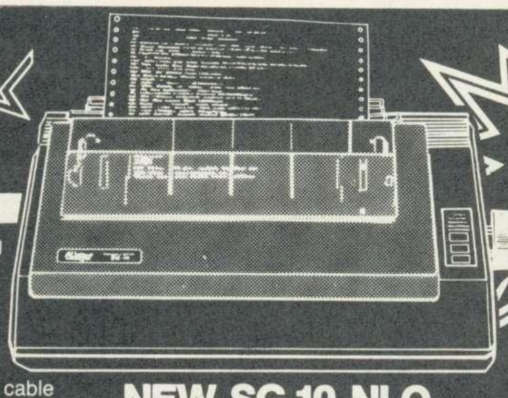
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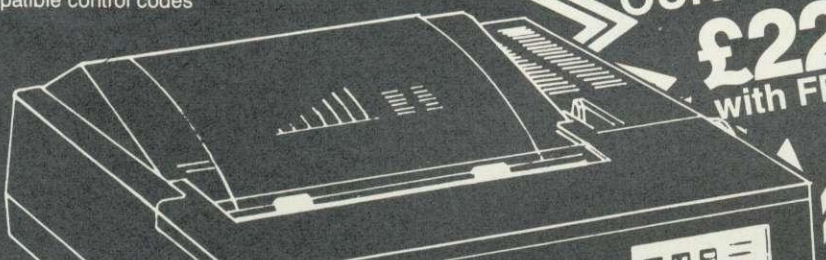
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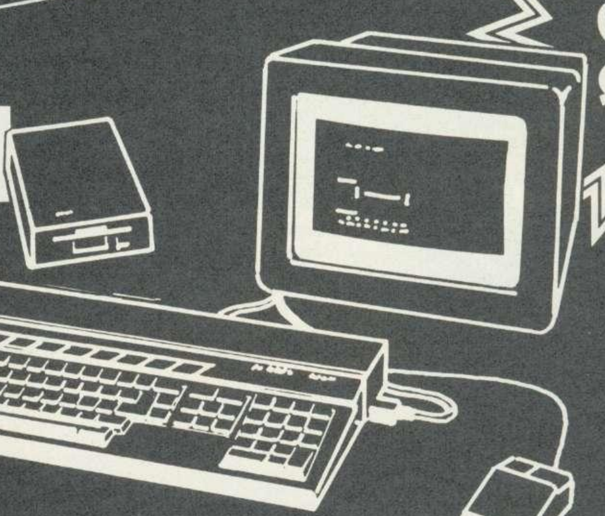


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LETTERS

Write to Letters, Acorn User, 68 Long Acre, London WC2E 9JH

CALL TO GRAPHICS

Sir, I have recently been appointed UK chairman for ACM SIGGRAPH, the computer graphics special interest group of the American-based Association of Computing Machinery.

I would be grateful to hear from anyone interested in computer graphics on micros, whether it be hobby related, in educational or commercial applications or professional users. I hope to coordinate a national user group and forum, eventually with a newsletter, meetings and possibly a public domain software library. Please contact me at 129 Ardmore Lane, Buckhurst Hill, Essex IG9 5SB, enclosing an SAE.

Mike Siggins
Chairman, SIGGRAPH UK
Essex

HAPPY AS I AM

Sir, With all this talk of new BBC micros, I hope Acorn and all other software houses remember that there are thousands of 32k users who will stick with their 32k computers for one reason or another, be it their extra ROMs (not all of us like to treat ROMs like 13 amp plugs), or be it the cost of a new computer.

D Harman
Cambs

AN ANSWER TO ARROGANCE

Sir, Your response to Mr Richards in December's issue distressed me not only because it showed an arrogance unbecoming in a magazine dependent on the public for its livelihood, but, more importantly, it would seem to suggest a lack of appreciation of how the home computer market is moving.

I suggest the euphoria of being able to 'zap the aliens' at home is evaporating and, if microcomputers are not to be relegated to the box room, it is time to encourage users to look at more intricate problems, how to implement these, and an indication of the practical uses of such techniques.

I do not know how Simon Dally devises his competitions (perhaps he has a secret compendium of them, or a particularly devious mind?), but I must admit they have often taxed me considerably. One aspect of at least some of them is that they could be better solved using a language other than Basic. Examples of programs in other languages would be most interesting.

You ask 'What to leave out?' I suggest you start with the silly Acorn Abuser's Diary.

Two other points: why does it take so long to get the bar code reader listings printed and where is page 60047565 on Prestel? (Or is that too going to be six weeks in coming?) Getting information into computers has been a major problem ever since they were invented. Any device which simplifies the job is worthwhile – but today, please!

B Humpidge
Notts

Your points about the direction of the micro market are well understood at *Acorn User*. In fact, we would claim to address this audience far better than any other user magazine.

Many of the techniques of use in solving our competitions have been covered *Acorn User*. Joe Telford, George Hill and McGregor & Watt on statistics, logic, recursion and sorting; Stan Froco's series on techniques (started in June 1983) – all of these have also pointed readers to more explicit books and magazine articles.

However, demand being what it is, we are going to carry a competition solution (we won't promise more that that!)

For Micronet, try page 600611 – the BBC software index.

Bar code booklets take so long because we don't print them until after the magazine is printed, so they can be checked and are as correct as possible.

GROUP HELP FOR MALAYSIA

Sir, I am contemplating setting up the first-ever BBC micro users group in Malaysia. Its main objective will be to maintain international contact among BBC micro users, especially from the UK, via the Microlink and Micronet 800 services.

I need to have a rough idea how many of our Malaysian readers are interested. Also, I'd be very glad to hear from established user groups on how to run a group efficiently. Please write to 72 Eccleston Road, London W13.

Shaharudin Ali
London

FOIL THE PROBLEMS

Sir, C A Jays' experience (*AU* December '85) with television interference on a Phloopy drive matches my own – with an AMS 3in disc drive.

For over a year I had used the drive with my BBC B coupled to an old Sharp portable TV, with no trouble. The TV stood on a wooden plinth above my disc drive. As I was doing a lot of wordprocessing, I bought a Philips green screen Monitor 80 and was then unable to format some new discs (usually the last few sectors only).

It was more reliable if I held in the connector on the drive unit, so I decided that the cable needed reconnecting. My dealer confirmed that this had happened before, and squeezed in the connector. Still no consistency.

It eventually dawned on me that the shielding provided by my hand was the cure for the trouble, so I spread a double thickness of kitchen foil over the plinth, and haven't had any more problems.

Denis Kenward
East Sussex

HINTS ON ADVENTURES

Sir, My friends and I need hints, tips and information on adventure games for the Electron – *Hulk*, *Twin Kingdom Valley*, etc.

If anyone can help, please write to us at 36 Ullswater Avenue, West Auckland, Bishop Auckland DL14 9LR.

Nicholas Tomlinson
Bishop Auckland

COBOL ON THE BEEB

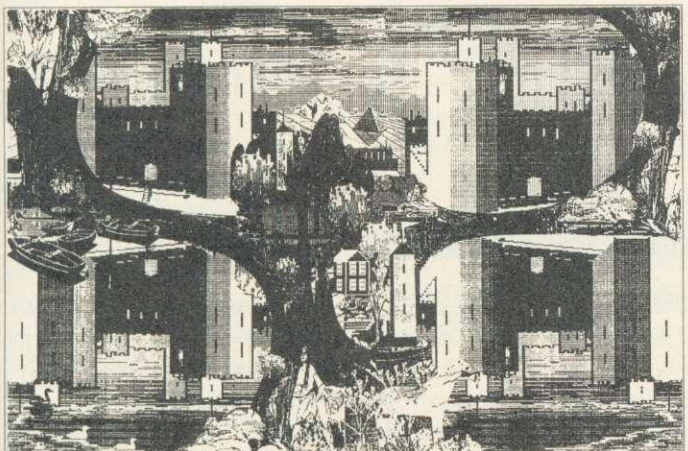
Sir, I enrolled on a City & Guilds Cobol programming course. A fairly large part of this course is devoted to Cobol programming on Apple IIe machines.

Of course, as I own a Beeb and not an Apple, I would like to ask your readers if anyone knows of any Cobol interpreters/compilers for the BBC micro. I would be most grateful for any help, as it would aid me in my studies considerably.

I Beckingham
Cheshire

A version of Cobol comes bundled with Acorn's Z80 second processor for the BBC micro. We don't know of any versions which will run on a standard BBC model B.

LETTERS



Castle of Riddles: a collage produced by reflecting the image

PRETTY AS A PICTURE

Sir, I enclose some printouts from a program which uses procedures from McGregor and Watt's book and the serialisation you carried in *Acorn User* (Oct '85 to Jan '86).

The landscapes (right) are created by experimenting with the program and have been used to illustrate school magazines. It is a great delight to RUN and watch the houses spring up in fine detail and trees growing more slowly from your prescribed places on the screen.

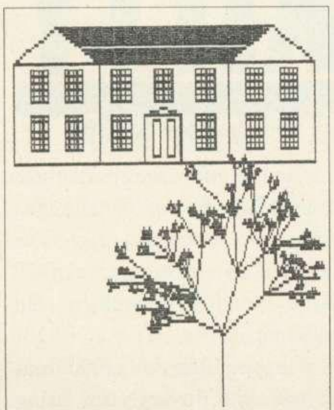
You can continue to add plants/trees to your scene until (on the BBC B) you run out of room.

This need not, though, restrict your ideas for a picture. A collage is easily produced from several varied printouts, and printing on to tracing paper enables you to reflect the image (without a graphics chip). This technique was used to produce Castle of Riddles (above).

The basic castle design was drawn with cursor control using Quicksilva's *Beeb-Art* program and saved on tape. Later, using the school's Epson MX80 printer, the design was printed on an A4 sheet of drafting film. Both sides of the printout were photocopied and I enjoyed creating a collage from photocopies using added details cut from other printouts.

Perhaps these ideas will encourage others to use the computer in 1986 to stretch their imagination by exploring creative graphics!

Valerie Crompton
Leeds



Landscape used to illustrate magazine

STAR CODING

Sir, Regarding the Hints & Tips article (*AU* January '86), the Star range of printers, which you have recently reviewed, offer two sets of control codes. One is Star mode and the other IBM. For the purposes of someone using commercial software, the IBM mode is the one to use as it is nearer to the Epson set of control codes.

If a customer does have trouble getting software to work properly in IBM mode, (the only one so far is AMX Mouse who have two SG printers and are modifying the printer drivers), we offer a set of EPROMs. These allow you to get even closer to the Epson set of codes and can be bought from us for a small cost. The advantage of this is that you will have almost 95 per cent Epson compatibility; the disadvantage is that you will lose the IBM block graphic characters.

Steve Jeffcoate
Star Micronics UK Ltd
London

PIRACY RESURFACES

Sir, I would like to raise the topic of software piracy – again. I have recently been given the task of moving much of my school's cassette software to disc and, later, Econet. I have found that many programs cannot be converted to run on disc because they are so heavily protected, yet all the pirates use tape-to-tape cassette decks which renders all-in program protection useless.

Surely software houses must be aware of this and realise that the time taken to load a program from cassette is lost educational and computer time.

I don't think it is unreasonable to move cassette software to disc, especially when the programs are not available on disc and the school has paid good (scarce) money for both the computers and the software.

The only people the software houses are hurting are themselves, since I for one shall advise my school not to buy any more software from these companies – in particular Acornsoft, who should know better.

Allan Kelly
Merseyside

We're afraid this is the age-old problem. Many software houses do support disc upgrades and Econet licences (although those tend to be expensive) for their programs.

Your best bet is to contact the companies directly and see what their terms are. We would welcome teachers' views on such schemes.

FORGOTTEN RAM?

Sir, I have had sideways RAM fitted for about six months now and feel it's a well-worthwhile investment for any Beeb owner. *Acorn User* has been particularly helpful with its numerous articles on the subject.

However, I cannot help feeling that the software houses aren't exploiting this extra RAM fully – after all, they are always complaining about the lack of memory on the BBC micro. Why not use sideways RAM to help solve the problem?

There are thousands of users with sideways RAM who could so easily use more sophisticated software – that would certainly show other computer users which is the best micro!

So go on, software houses, give it some consideration.

Tim Alfrey
Kent

HAS MARK LOST THE EDGE?

Sir, Mark de Weger's brilliant commercial bid (*AU* Jan '86, Letters) to produce all possible programs for the Beeb may require help on a larger scale than Mrs Thatcher can provide!

First, and to answer Mark's question, $2^{227328} \times 28416 \simeq 2^{227343}$ (since $28416 \simeq 2^{15}$) CALLs need to be made. In the UK we have 3×10^6 unemployed who could test $3 \times 10^6 \times 52 \simeq 2^{27}$ programs each year. Hence Mrs Thatcher's team of co-operators would take 2^{227317} years to complete it, and Mark's edge on the market may have been lost.

He needs to enlist the support of the 2^{227342} small furry creatures from Ursa Minor, who, also testing at the rate of one program a week, would complete the job in a fortnight!

Colin Lindsay
Preston

LOSING TOUCH WITH EDUCATION

Sir, We have read with interest the recent correspondence regarding Amcom E-NET, and would like to add our own comments.

First, we agree entirely with the enthusiastic comments of Mr Ward about Amcom itself. It is a first-rate company, always ready to offer friendly and helpful advice. Moreover, their 'safety first' financial policy inspires more confidence than another manufacturer of networks we could mention! But their main claim to fame must surely be that they were the first to recognise the viability of Winchester systems for schools, and their experience in this field makes them the number once choice for schools about to set up networks.

Second, I wonder if it is not you who is 'losing touch with the reality of education'. At Brecon High School we have a 35-station E-NET supported by a 40-megabyte Winchester; there are at least four other Winchester-backed E-NETs in Powys schools alone. I am sure that I speak for many others in education in saying that *Acorn User* should set its sights higher – some articles on Winchesters, large network management, magnetic tape streamers, mainframe access, to mention but a few, please.

Dr M H Williams and
P Codling
Brecon

A NEED FOR IDEAS

Sir, I've looked very thoroughly through the advertisements in *Acorn User* trying to find an 'ideas processor' for the BBC microcomputer of the *Twenty/Twenty* or *Deja Vu* type.

If you know of a suitable source I'd be glad to hear of it.

Peter Hancock
Guernsey

The only program we've come across which seems likely to fit the bill is *Scratchpad*, which is by a company called Innovative Software and costs £24.95. We'll be carrying (space permitting!) a full review of this program in the April issue, but, meanwhile, our reviewer says '*Scratchpad* is a well-organised utility . . . for those who need an aid to structuring their work it could prove useful.'

DEAR KITTY

For simple answers, address your queries to Kitty

Charles Canavan of London writes saying that now he has come to grips with programming in Basic, he's feeling a bit more adventurous and would like to take the lid off his micro. He fancies having a look inside and installing a ROM which he was given for Christmas.

However, he confesses to being somewhat baffled by the geography of the main circuit board. He has heard of positions being referred to by points of the compass, but which way is north? Also, what are links?

There is nothing particularly mind-boggling about delving inside the BBC micro's case, as long as you are sensible and take a couple of simple precautions.

Remember that if your micro is still under guarantee, simply removing the lid will invalidate it.

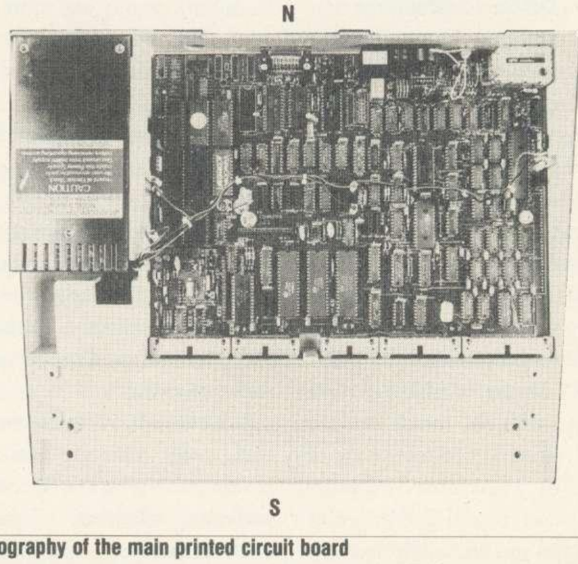
To remove the lid you'll need a cross-point screwdriver and room to work in.

It goes without saying that the micro should be switched off and disconnected from the mains, as well as from any other items of equipment, such as disc drives and printers. There are four screws to remove, two on the underside and two at the back of the case – all clearly marked 'fix'. With the Beeb back the right way up, take off the lid and put it (and the screws) somewhere safe.

Before you do anything else, do protect yourself from static electricity – in computer terms this stuff is deadly as it can completely destroy the innards of your chips. Work on a clean and preferably earthed surface: an aluminium sink is perfect.

If that is not practicable, a wooden table is fine – but do keep clear of nylon carpets as they generate static electricity by the bucketful. In fact, to be safe, don't wear anything made of nylon either. Also, be careful of things like TV and monitor screens as these can be full of static. Finally, discharge any static you may have built up by touching an earthed metal item, for example, a cold water pipe.

With your lidless micro in front of you, with the keyboard facing you, north is the back of the case (ie, where all the sockets are – TV, analogue port, etc); south is the front (the keyboard); west is to the left (the side with the power supply); and east is to the right.



The geography of the main printed circuit board

The ROM sockets which you want to put your ROM into can be found in the bottom right-hand side of the case (south-east), just under the keyboard. You will need to remove the keyboard to get at these, so follow the instructions supplied with your ROM.

Locate the red function key f6 at the top of the keyboard and move north to the edge of the keyboard. Look directly down on to the micro's main circuit board and you will see a cluster of four pairs of pins with plastic connectors on them. These have the letters S20, S21 and S22 written in yellow at their edges and are typical examples of links.

Very simply, they allow the more advanced user to define certain conditions within the micro. This can be achieved by making or breaking various links and can be done in two ways: simply removing a link (that's the plastic connector bit) or placing the link in a new position. Look at link S22: it has three pins with the link sitting across two of them. Moving the link to sit across the middle and the presently unused pin will reset the link and configuration.

Don't be too afraid of looking inside your micro. As long as you follow the advice above and are generally thoughtful and careful, neither you nor your Beeb should come to any harm.

PROGRAM UPDATE

Write to Program Update, Acorn User, 68 Long Acre, London WC2

ON THE TRANSFER LIST

SEPTEMBER 1985

Our kiwi *Wordwise* expert, Neil Gordon, has come up with the solution most of you were after – getting his *Wordwise* program editor to work with *Wordwise Plus* and to edit longer programs. Neil has the details . . .

After loading in the old pro-

```
 400 LDA #0
 402 STA rdpointerL
 404 STA wrpointerL
 406 LDA topH
 408 STA rdpointerH
 410 LDA #132
 412 JSR osbyte
 414 DEY
 416 DEY
 418 STY wrpointerH
 420 STY topH
 422 .loop1
 424 LDY #0
 426 .loop2
 428 DEY
 430 LDA (rdpointerL),Y
 432 STA (wrpointerL),Y
 434 CPY #0
 436 BNE loop2
 438 LDA rdpointerH
 440 CMP pageH
 442 BEQ movedone
 444 DEC rdpointerH
 446 DEC wrpointerH
 448 JMP loop1
 450 .movedone
 452 LDA wrpointerH
 454 STA pageH
 456 LDA #131
 458 JSR osbyte
 460 TYA
 462 CLC
 464 ADC #5
 466 STA wrpointerH
 468 STA rdpointerH
1695 B$=B$+"|[|["
```

Listing 1. Works with Wordwise Plus

gram, make the following alterations. First change the checksum value on line 120 to 28558. Then delete lines 390 to 500 inclusive and type in the new lines 400 to 468 given in listing 1. If you are using *Wordwise* to edit the program, the easiest way to insert the lines is to go to the bottom of text, enter AUTO 400,2 as a new line, then the text of lines 400 to 468 without line numbers. When you return to Basic the new lines will be automatically numbered. Finally, add the new line 1695 given at the end of listing 1.

The problems with the old version arose because the text of the Basic program was written into the area of memory between TOP and HIMEM.

If the program was very long there wasn't enough room to store both the tokenised program and the equivalent text. This new version first moves the Basic program to the top of memory, then writes the text below it.

Lines 400 to 420 set up counters for moving the Basic program up in memory, including an OSBYTE 132 call to find HIMEM (line 412).

At least one 256 byte page must be left free below that otherwise listing the Basic program won't work. After the program has been moved up (lines 422 to 450) PAGE is reset, then an OSBYTE call is made to work out the value of OSHWM (ie, the default value of PAGE). The listed program is stored starting five 256 byte pages above that, to allow room for *Wordwise* or *Wordwise Plus* to store various tables when they are initialised (*Wordwise Plus* needs five pages, but *Wordwise* needs only two).

The final modification (of line 1695) is equivalent to the Escape key being pressed twice, to switch from the text to the menu and back again. If this is not done *Wordwise Plus* will not read out the instructions stored in function key f1 when CTRL/Shift/f1 are simultaneously pressed to switch back to Basic.

Readers might like to know that Neil's improved program can be found on this month's listings disc and cassette.

FONT GENERATOR

DECEMBER 1985

Anneke Sicherer-Roetman from The Netherlands points out that the Matthew Cook's excellent Font Generator program can be used with PAGE kept at &1900. Anneke writes . . .

Assuming that any program calling *FONT has a maximum of one file open at any time, all you have to do is to issue a *FX179 before the *FX20,6. In listing 3 this means replacing line 60 with *FX179,10,255 which results in the character set being placed at &1300-&18FF – this makes the computer believe that OSHWM is at &1300 at the moment of the *FX20 call. This saves 1.5k.

A useful tip, but readers using ADFS will not be able to claim the space as PAGE cannot be lowered.

DATA COMPRESSION

DECEMBER 1985

Thanks to Florian Diete from West Germany who pointed out an easy way of squeezing D J Pilling's data compressor into a single page. The code occupies 257 bytes but by making these changes this can be reduced to 255. Change line 1110 to read:

1110 BEQ writebytes

and delete line 1120. Simple!

As if the programs in Acorn User *each month were not good enough already, many of you have been sending in improvements! Not that we mind, of course, in fact we are going to encourage you to do just that, by printing a selection of the best! So please send in your improvements, mark your letters 'program update' and send them to the Technical Editor.*

AUTOMATIC DISC MENU

SEPTEMBER 1985

Frazer Bennett of Cambridge has been turning Peter Rochford's automatic disc menu program into what he calls . . . well, Frazer can tell you himself . . .

I found the program very useful, but one drawback was that it was not possible to display infor-

```
  235 IF INKEY(-1) THEN PRO
Cinfo(W$(A%-64)):RUN
 1600 DEFPROCinfo(f$)
 1610 VDU28,0,19,39,5
 1620 CLS
 1630 VDU131,141:PRINTTAB(7
);"Information about ";f$
 1640 VDU131,141:PRINTTAB(7
);"Information about ";f$
 1650 PRINT
 1660 X=OPENIN f$
 1670 empty=TRUE
 1680 PTR#X=PTR#X+1
 1690 PRINT
 1700 PTR#X=PTR#X+3
 1710 O%=BGET#X
 1720 IF O%=&F4 THEN empty=
FALSE:GOTO 1750
 1730 IF O%=32 THEN GOTO 17
10
 1740 GOTO 1800
 1750 REPEAT
 1760 F%=BGET#X
 1770 PRINT CHR$(F%);
 1780 UNTIL F%=13
 1790 GOTO 1690
 1800 IF empty=FALSE THEN 1
850
 1810 PRINT'''
 1820 VDU134,141:PRINTTAB(5
);"No information about thi
s file"
 1830 VDU134,141:PRINTTAB(5
);"No information about thi
s file"
 1840 PRINT'
 1850 VDU131,141:PRINTTAB(8
);"Press SPACE to continue"
 1860 VDU131,141:PRINTTAB(8
);"Press SPACE to continue"
 1870 REPEAT:UNTIL GET=32
 1880 CLOSE#X
 1890 ENDPROC
```

Listing 2. Displays REM statements

mation about each separate file without loading and examining it. This facility could have easily been incorporated, but not if the program was to be 'fully automatic'. The addition here (listing 2) will make the program display all the REM statements at the beginning of the chosen file if Shift is held down when the chosen file is selected.

Pressing Space will then return to the menu.

To do this, add the lines in listing 2.

Readers can find Frazer's improved menu program on this month's listings disc and cassette.

Watford Electronics

Jessa House, 250 Lower High Street, Watford, England
Tel: Watford (0923) 37774/40588 Telex: 8956095 WATFRD
Credit Card Orders (ACCESS & VISA) Tel: (0923) 33383 or 50234 (24 Hours)

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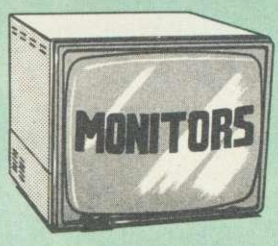
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- PHILIPS 12" Hi-Res Amber Monitor **£73**

FIDELITY COLOUR MONITOR

- Medium Resolution, attractively finished, 14" RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen.

£169

ZENITH

"Test Bureau Recommended for use in Education".

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality monitors as used in the larger Zenith Micro Systems.)

Green (New Design) Hi-res **£72**
Amber (New Design) Hi-res **£76**

LEADS

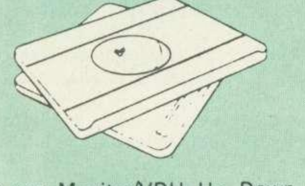
BNC Lead for Zenith or Philips **£3**
RGB lead for KAGA **£3**

N.B. Carriage on Monitors **£7** (securicor)

CREDIT CARD Orders (ACCESS or VISA) Simply phone (0923) 33383/50234 24 Hour Service

SWIVEL BASES

for Video Monitors



Adjust your Monitor/VDU, Up, Down, Right or Left to provide utmost in operator flexibility & Viewing comfort. It improves your sight lines & reduces stress & eye, neck and back strain. Available in 2 sizes:

for 12" Monitors **£14**
for 14" Monitors **£16**
(carr. £2.50)

WATFORD'S WINTER SALE

Many customers have asked why Watford doesn't have a Winter Sale. We asked why Watford doesn't have a Winter Sale. As we could see no reason why we shouldn't, for ONCE, we're having a truly spectacular sale with some of the lowest prices you've probably ever seen!

HARDWARE

- AMSTRAD PCN8256 Micro **£375**
- BBC B PLUS 64K Micro **£359**
- Acorn 6502 2nd Processor **£155**
- Acorn Z80 2nd Processor **£297**
- TORCH Z80 Card **£199**
- Acorn Bitstick **£299**

PRINTERS

- Epson LX80 **£195**
- Hi80 Plotter **£299**
- Centronix GLP **£105**
- KAGA KP810 **£189**
- Epson FX80 **£245**
- JX80 Colour **£420**
- Brother HR15 **£285**
- Sakata Plotter **£139**

SOFTWARE (ROMs)

- Watford DFS Kit **£48**
- Acorn DFS Kit **£47**
- Watford DDFS Kit **£45**
- Watford DDFS + **£22**

ACORN's ROMs Packages

- BCPL **£44**
- ISO PASCAL **£42**
- LISP **£34**
- VIEW 2.1 **£39**
- VIEWSTORE **£39**
- FORTH **£32**
- LOGO **£42**
- TERMULATOR **£24**
- VIEWSHEET **£39**

Miscellaneous ROMs

- ACCELERATOR (CC) **£42**
- ADE (SY) **£38**
- BEEBFONT (WE) **£23**
- BEEBMON (WE) **£22**
- BUFFER/BACKUP (WE) **£17**
- COMMSTAR (P) **£24**
- COMMUNICATOR (CC) **£47**
- DATAGEM (G) **£49**
- DISASSEMBLER (WE) **£15**
- Dumpout 3 (WE) **£22**
- Epson NLQ (WE) **£22**
- FILE-PLUS (WE) **£28**
- GRAPHICS Rom (CC) **£23**
- INTERSHEET (CC) **£39**
- INTERCHART (CC) **£26**
- LOGOTRON LOGO (L) **£55**
- MUROM (BB) **£23**
- SLEUTH (WE) **£22**
- NLQ DESIGNER (WE) **£22**
- ROM-SPELL (WE) **£22**
- ROMAS (WE) **£42**
- ROM MANAGER (WE) **£18**
- TOOLKIT + (BB) **£29**
- TRANSFER ROM (WE) **£22**
- ULTRACALC (BC) **£48**
- WORDWISE (CC) **£28**
- WORDWISE + (CC) **£39**
- WORD-AID (WE) **£17**

DISC SOFTWARE

- AMX DESK **£18**
- AMX UTILITY **£11**
- AMX Educational **£20**
- DIAGNOSTIC DISC (WE) **£17**
- DISC EXECUTOR .... (WE) **£9**
- INVESTIGATOR (WE) **£17**
- Office Master (G) **£19**
- OFFICE MATE (G) **£10**

5¼" DISCS

Lifetime warranty on Discs

(In Plastic Library Cases)

20 × S/S D/Density 48TIP **£18**
20 × D/S D/Density 48TPI **£23**
20 × D/S D/Density 96 TPI **£30**

(In Lockable Storage Units)

50 × S/S D/Density 48TPI **£48**
50 × D/S D/Density 48TPI **£66**
50 × D/S D/Density 96TPI **£74**

PERIPHERALS (incl. Software)

16K Disc RAM **£28**
16K Sideways RAM Module **£27**
32K Shadow Ram Board **£54**
Sideways ZIF Socket **£14**
Solid State 16K Sideways RAM **£26**
Solderless Sideways ROM Board **£30**
Watford ROM/RAM Card 32K **£42**
Watford ROM/RAM Card 64K **£64**
Watford ROM/RAM Card 128K **£99**

EPROMs for BBC's Sideways ROMs.

2764-250nS £1.85
27128-250nS £2.55

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £3.50
2 × 6264LP (16K) £6.70

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

EXAMPLE PACKAGE
BBC B Plus (64K) Micro; Wordwise Wordprocessor, Twin 800K Double Sided Mitsubishi Disc Drives, Zenith Hi-Res Green Monitor, Brother HR15 professional quality Daisy Wheel Printer, Gemini Database, Spreadsheet, Beebplot Graphics, Accounts Pack: (Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements and Stock Control) Software packages on Disc with Manuals.

NEW LOW PRICE

Only £999

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

MARK II LIGHT PEN

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor.
The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

Mark II Light Pen **£25**

Continued →

The ULTIMATE DFSs for the BBC MICRO

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)

Just compare the features:

Features	Acorn 1.20	Watford Single Density	Watford Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20 partial	1.43 Yes	1.53 Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£59**
- *Acorn's DFS Kit complete* **£59**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£16** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£58**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.
Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.
Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation.

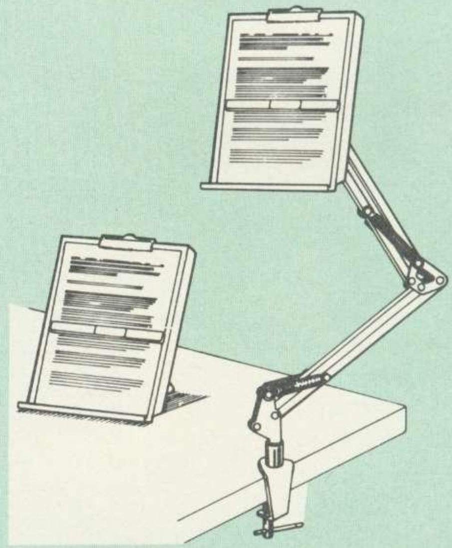
DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection – Full single and double density operations – Extremely powerful and comprehensive OSWORD &7F emulation – Any file can be full size of disc – Density of last access assumed for speed – Automatic 40/80 stepping swapped on error – All Acorn's extra disc commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.
Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.
The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!
Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

DDFS PLUS (for BBC Plus) **£30**
(Price includes comprehensive manual)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.
Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.
Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.
The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.
Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£17** *(carr. £3)*

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them.

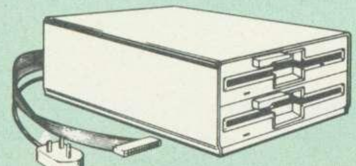
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

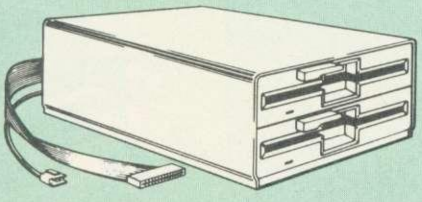
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

When using a BBC Micro, most people find themselves preciously short of space. The Watford's BBC Micro Plinths form an ideal way of recovering some of this space; your BBC, disc drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. Some of our competitors offer disc drives built into plinths, but these aren't as sensible as you might think. With a Watford Plinth, your disc drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen and paper, reference manuals, etc. Follow the trend with Watford Plinth.





Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS100 £76		CS100 £89	
200K (360K)	CLS 200 £76	CLD200 £140	CS 200 £89	CD200 £145
400K (720K)	CLS 400 £80 / £83 CLS400S	CLD 400 £140	CS 400 £100 / £103 CS 400S	CD400 £145
800K (1.44M)		CLD800 £162 / £165 CLD 800S		CD 800 £179 / £186 CD 800S

- TWIN Disc Drive Case, complete with Power Supply & Cables **£35**

Securicor carriage on Disc Drives £5

Prefix **C** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix **S** *= 40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£12**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£15**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£22**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£22**

- *10 × 3½" S/S D/D 40/80 track Discs* **£25**
- *10 × 3½" D/D D/D 40/80 track Discs* **£35**

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

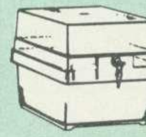
- *10 ×* **M4** *S-S D/D 40 Track Discs* **£11**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£14**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£19**
- **3"** *Double Sided Discs* **£4** *each*

DISC ALBUMS

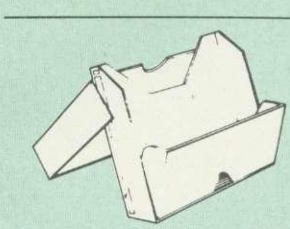
Attractively finished in Antique Brown, leather look vinyl. Stores upto 20 Discs. Each Disc can be seen through the clear view pockets. **£4**

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



M35 - holds upto 40 discs **£9**
M85 – holds upto 95 discs **£12**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. **£8**

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.95** Twin (with PSU) **£3.90**



Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

THE NLQ DESIGNER

KAGA KP819/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

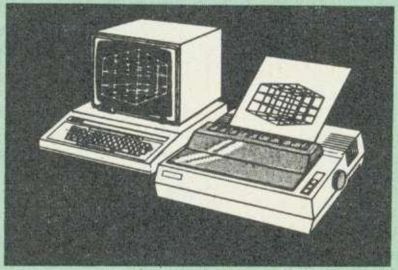
- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

Now available:

- Centronics GLP Printer NLQ Designer ROM **£20**
- GLP Individual FONT ROMs **£14**

(Write in for further details on both).

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

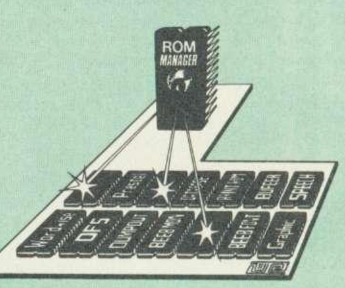
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

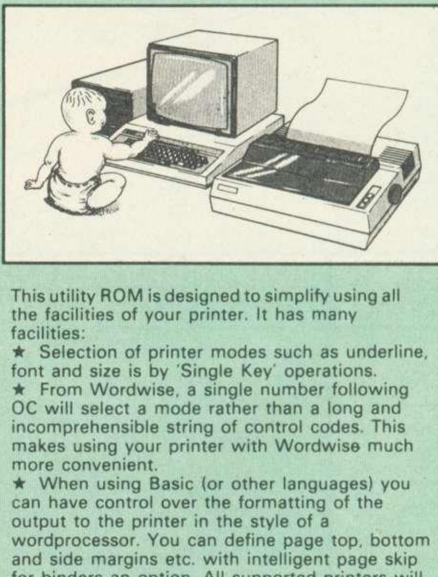
SPECIAL OFFER £18

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc.
(Please write in for technical details).

ONLY **£25**

BEEB PRINTER ROM

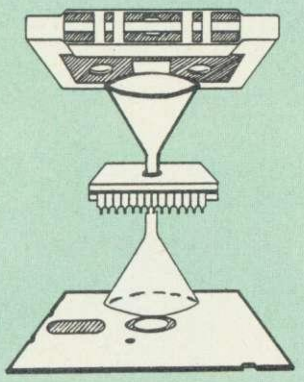


This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:
★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.
★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £25

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

After months of top secret development, we are now able to supply details of this advanced and sophisticated utility ROM for the BBC micro. Just look at the features:

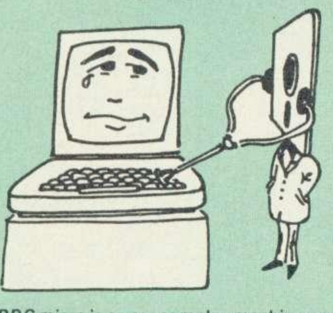
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

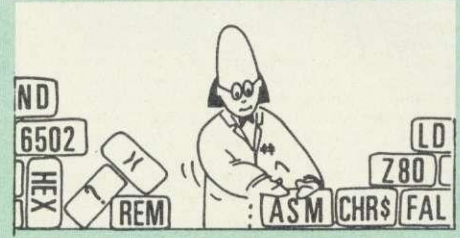
Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!



ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£34**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROM-SPELL

"way ahead of any competition"



ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary"

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Don't settle for less, Buy the best.

ROM-SPELL costs only **£25**

(Please state 40 or 80 track disc)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10** (40 or 80 track)

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.

Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

(Write in for technical details.)

£24

DISASSEMBLER ROM

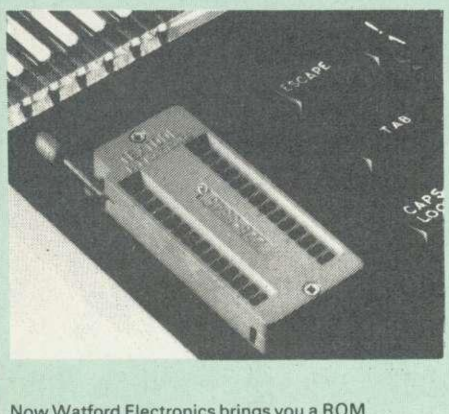
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

Please write in for technical details.

ONLY **£16**

Continued →

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15**

16K Sideways RAM Modules

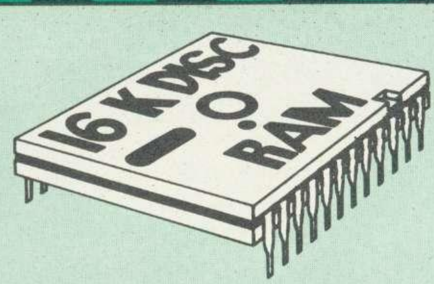
This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Introductory offer: **£29**

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**



This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

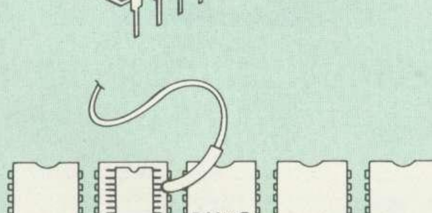
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM

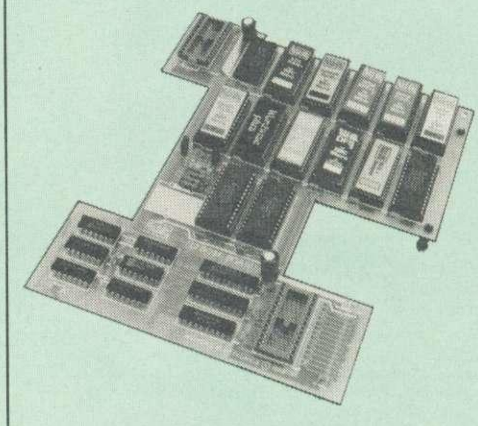




This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. Compatible with BBC B Plus. Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28**
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£35**

EXTERNAL Sideways ROM BOARD

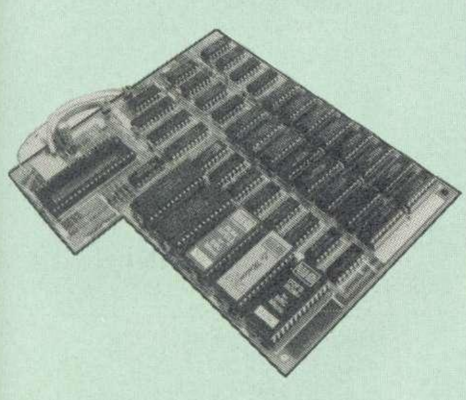
This extremely versatile 12 ROM Socket Board is supplied with power supply, boxed in an attractively finished BBC beige. A second board can be fitted at a later stage to give a total capability of 28 ROMs.

- No soldering required.
- Easy access to ROMs.
- Does not physically interfere with other internal add on boards.
- Built in power supply.
- Write protect for RAM.
- Allows upto 32K Static RAM and 24 ROM Sockets in varied combination.

Price: **£75** (carr **£3**)
(2nd Add-on Board **£30**)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Write protect for ALL RAM.
- Master write protect for all sockets.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

● *ROM/RAM card with 32k dynamic RAM*	***£45***
● *ROM/RAM card with 64k dynamic RAM*	***£69***
● *ROM/RAM card with a massive 128k dynamic RAM*	***£109***
OPTIONAL EXTRAS:	
● *16k plug-in Static RAM kit*	***£9***
● *Battery backup*	***£2***
● *Read and Write protect switches*	***£2***
Complete ROM/RAM board (all options installed)	***£125***

Le Modem





The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*

- *BT Approval applied for.*

Price: **£89** (carr £3)

(Price includes Software ROM, Cables and Manual)

Nightingale Modem

SPECIAL PRICE to our Customers

£119

(Price includes COMMSTAR ROM & comprehensive manuals)

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

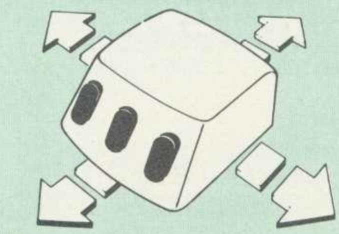
LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £66.95

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.50**
AMX SUPERART Package	**£43**
AMX PAGE-MAKER Pack	**£43**
AMX 3D ZICON Disc	**£21**
AMX Database Disc	**£21**
AMX XAM Educational	**£21**

COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really brings those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Price **£10**

(please specify 40 or 80 track disc when ordering)

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£52
CARETAKER Basic Utility	£27
Graphics ROM	£26
Disc Doctor ROM	£26
TERMI	£27
COMMUNICATOR	£58
SPEECH ROM	£26

Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: **£32**

Wordwise plus

£45

FREE FREE FREE

This month we are giving away absolutely FREE, the superb Word-Aid ROM worth £20, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Only **£20**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

£45

INTER-CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

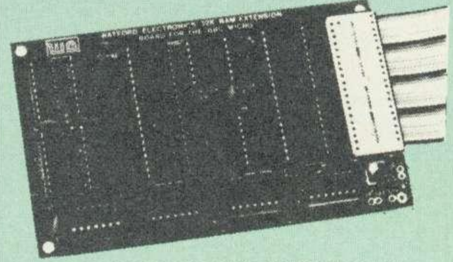
ONLY: £30

These ROMs form part of the first and only truly integrated range of programs for the BBC. Up to 16 sets of data can be stored in memory at once and data can be transferred directly and simply between programs, e.g. from sheet to sheet, or sheet to chart, or word processor to sheet etc., etc.

INTER-WORD and INTER-BASE will follow shortly to complete this suite of programs.

P.S. The Watford 32k shadow RAM board is an ideal complement to these programs, allowing them to operate in the 80 column screen modes with NO reduction in memory.

32K
SHADOW RAM-Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

● IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

● "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

● In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.

● Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

● Use 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only a 12K printer buffer can be used in Wordwise or Wordwise Plus due to the way in which they are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.

● Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.

● Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Only: £59

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:

Only £69

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

VIEW

VIEW WORDPROCESSOR 2.1 .... **£46**

VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft)	**£49**
VIEWSTORE	**£49**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £10

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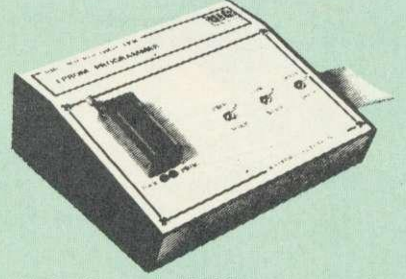
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SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:

Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.

Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

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This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Features offered by this package include:

- The adding of pictures or written text to typed documents.
- Unattended recording of scientific data.
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- Generation of computer images.
- Slow scan television; sending images via a modem or radio.
- Security.
- Input from any video 1v video source.
- Full resolution in Modes 0,1 or 2.
- 1.6 seconds scan time.
- Up to 8 grey levels
- Manual or Auto level control
- Connects to user port

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

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(Price includes: Digitiser Unit, ROM & a comprehensive Manual.)

MAGAZINE MAKER

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They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

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Continued →

MASTER WORK

Our technical editor takes the lid off the simplest of Acorn's new series of micros, the Master 128, and looks at one of its upgrade boards, the Turbo co-processor

Bruce Smith

Rumours have been circulating over the past six months or so about the impending arrival of model C BBC micro from Acorn. As revealed exclusively in last month's issue of *Acorn User,* it is now with us, under the name of the Master. In fact the Master is not a single micro but a range of computers, with the Master 128 as its cornerstone. By plugging in a variety of boards containing different microprocessors it's possible to emulate just about all the computing operating environments you are likely to need.

Over the next five pages I'll be looking at the Master 128 in depth, and also touch on the first of these upgrade boards, the Turbo coprocessor. The other co-processors will be the subject of a whole series of articles planned to make you familiar with what looks to be the start of a new and exciting era in Acorn using.

The first question on everyone's lips as soon as a new micro is announced is 'How much memory?'. I've always wondered why this is. Certainly you can write longer programs if that's what you want; you can store more text or data if you're using a wordprocessor, spreadsheet or whatever, but it doesn't tell you anything about the micro's capabilities – and at the end of the day that's what really counts.

However, for the record, the Master 128 has exactly 50 bytes more memory than the last Acorn micro, the BBC B+ 128, but the introduction of those 50 bytes and the way in which 12k of the 128k of main memory has been re-arranged transform the machine. Add to this a new internal design which will allow even an absolute novice to add sophistication to his or her computer, and you have turned the Master into a home, school and business micro that its competitors will find hard to beat – as you'll realise as you read on.

In appearance the Master is quite different to previous Acorn computers. The colour of the case matches that of a normal Beeb, and mounted in it are the standard BBC keyboard, and to its right, a full function numeric keypad. In addition to the standard numeric keys this includes keys such as Return, Delete and mathematical functions – a total of 19 in all.



The Master 128: the cornerstone of Acorn's new range of micros which can be upgraded with co-processors

Above the keypad are two cartridge slots with spring loaded shutters, to take standard Acorn cartridges and allow the user to simply plug in software. The format is similar to the Electron Plus 1, and it's perhaps not surprising to find that Electron cartridgeware will function correctly on the Master.

To accommodate these extra features, the width of the Master has increased about two and a half inches over that of the BBC micro. Its depth is the same and there is a slight increase in height over the Beeb.

The function keystrip is now limited to the left-hand two-thirds of the micro, and is inclined at a slightly greater angle to increase readability, though it must be said that there is a slight magnifying effect due to the bevelling of the plastic, which can be a little off-putting to the user.

At the back of the micro all the standard BBC interfaces are available. To the power supply side of the case is a small perforated disc which can be pushed out to allow passage of telephone cable if an internal modem is installed at some later stage.

The base of the micro contains the usual BBC micro connectors, arranged in the same order as before.

To the side of the Break key is now a small locking device which can easily be turned with a screwdriver to inhibit its action. This innovation will undoubtedly please the hecklers who have bemoaned the lack of such a feature since day one – of course, if they knew anything about programming the BBC micro they would know that the software key to do this has always been there.

Any slight resemblance the Master may bear to a standard BBC micro is lost when the lid is removed – inside it's like another world. The first thing to notice is that there are fewer chips but those that do exist are much larger than previously. Acorn has now moved further into

the arena of gate array chips – customised chips that Acorn has designed to replace up to a dozen or more smaller ones. Devising these often involves designing the circuit on a smaller board which, for testing purposes, is plugged into the appropriate socket on the board. Once finalised, this circuit is redesigned into a single chip – the gate array. The upshot of all this is that the reliability of the micro increases many-fold – there's less to go wrong – and also the power consumption is reduced. There are six new CMOS gate arrays in all, including special chips to handle the keyboard,



Inside the Master 128: this model has the Turbo co-processor and Econet interface fitted

Input and Output and the television display.

To increase reliability and decrease power consumption even more Acorn has also made use of CMOS micro processor chip technology. The processor that makes all this run is the eight bit 65C12 chip. In software terms this is identical to the chip supplied with the standard 6502 second processor – the 65C02. It is also fully compatible with the standard 6502 chip supplied on the BBC micro and Electron.

The difference between the new processor and the old one is that it has an increased range of machine code instructions. In simple terms this means that it is now possible to write much more efficient machine code programs. As programs can be written in fewer instructions they will also run that bit faster. Obviously programs written using the enhanced instructions of the 65C12 will not run on a standard BBC micro, but 6502-based programs will run on the 65C12.

The other notable feature of the hardware is the inclusion of a single 128k ROM containing the Master's supplied firmware. Acorn has termed this its Megabit ROM – remember, this is Megabit not megabyte, which could lead to confusion. I'll look at the 128k MegaROM in more detail below.

A gap about the size of a cassette tape appears between the edge of the main printed circuit board (PCB) and the newer uprated power supply, for the inclusion of a third party modem. Extra sockets are provided on the PCB for this, which means that with an internal modem fitted, the RS423 serial port is still free for other uses – such as driving a serial printer.

The sound chip still supplies three sound channels plus a single pseudo random noise channel. However, it's much louder than before and connections are provided for use with a modem for generating dialling tones. The chip also drives an external phone connector fitted at the rear of the case.

The familiar 6845 CRTC chip is still present as are the user and machine 6522 VIA chips, and the analogue to digital convertor chip.

The number of sideways ROM sockets has decreased from the BBC B+'s six. Now there are three arranged as 2 by 32k sockets and a single 16k socket. Note that the minimum ROM size is now 16k; however, 8k ROMs may be fitted into external EPROM cartridges and plugged into a cartridge socket. The cost of the EPROM socket will be about £15.

The only obvious omission from the Master board over the BBC B and B+ boards are sockets for the speech interface. These have been omitted on purpose to optimise the board design. No doubt they will follow later in the form of the plug-in speech cartridge.

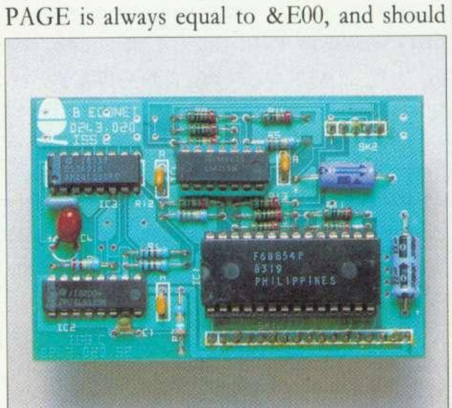
As mentioned, the Master comes with an extra 50 bytes of memory. These 50 bytes do not appear within the memory map, though they may be accessed via MOS calls. This RAM is battery backed which means that its contents are always powered and therefore not lost when the machine switches on. Stored within the RAM are the configuration bytes which define exactly how the Master is configured when it is switched on. You may alter these configurations using the appropriate command and thus define exactly how you want your Master to act on switch on.

The memory map

Figure 1 shows the memory arrangement. The Master 128 is fitted with 128k of RAM, and to understand how this memory is arranged, study the diagram as you read this. The first and main bank is the normal 32k supplied with the standard BBC B. This runs from &0000 to &8000. The 32k of memory above &8000 is used by ROM, the first 16k of which is normally Basic and the upper 16k is the Machine Operating System. The 32k below &8000 is used as follows:

- &0 to &DFF – Basic (or language) and MOS workspace
- &E00 to &3000 – Programming area
- &3000 to &7FFF – Memory for high resolution screen

Depending on screen mode, the &3000 boundary is moveable up to &7C00. Note that PAGE is always equal to &E00, and should



Econet upgrade board

not normally increase in value by adding more master ROMs.

The next 32k of memory is split into two sections. The first 20k bank is used as a shadow screen in identical fashion to the BBC B+ and Aries and Watford shadow RAM boards, so programs may now run and take full advantage of memory right up to HIMEM, ie, &7FFF, no matter what screen mode is selected.

The remaining 12k, which was unused on

the BBC B+ (for obvious reasons now!), comes into its own. It is to this region of memory that all of the previous memory grabbing operations have been allocated. This includes all ROM workspace, a fully exploded character font, and function key buffers. Figure 2 shows how this is ordered.

As you can see the 12k is itself split into two regions of memory. The first 1k holds the function key definitions. This space has increased four-fold over the BBC B and B+ and means that function key definitions may be up to 1000 characters in length in total. The next

***APPEND**	functions as BUILD but appends to end of file
***BUILD**	as DFS but control codes input by ¦ mechanism
***CLOSE**	closes open files on current filing system
***CONFIGURE**	to set-up start-up options
***CREATE**	creates empty file using *SAVE parameters
***DELETE**	as DFS delete
***SHOW**	displays soft-key contents
***DUMP**	<start in file> <start address on output>
***EX**	examine file (similar to *INFO)
***EXEC**	as DFS
***GO**	to enter address in language/IO processor
***GOIO**	to enter program at address in IO processor
***IGNORE**	as *FX6
***INFO**	as DFS
***INSERT**	inserts ROM number n into ROM map from reset
***LIBS**	define FS where LIB is from current FS
***MOVE**	copies files from one name to another including between filing systems
***PRINT**	as TYPE but gets/processes VDU codes
***REMOVE**	as DELETE but no error message if not found
***ROMS**	lists ROM names, sockets, version and UNPLUG/PLUG
***SHADOW**	with 0 or no parameters, gives shadow on next mode. with 1, drops shadow on next mode
***SHUT**	close open files on all filing systems
***SPOOLON**	functions as SPOOL but appends to end of file
***STATUS**	lists status of start-up options
***TYPE**	as DFS but control codes displayed as ¦D etc
***UNPLUG**	removes control codes displayed as ¦D etc

Table 1. The new MOS commands

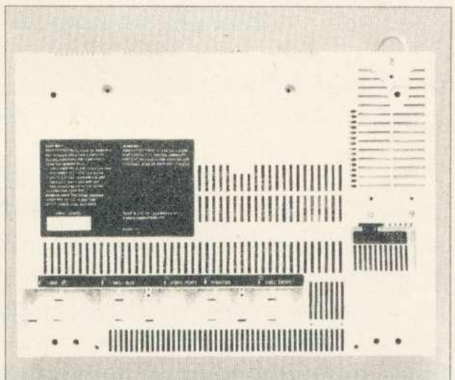
1k is used by the MOS as private workspace. In fact it performs calculations when carrying out fast flood-filling graphics.

The next 256 bytes in this area are used as VDU variable storage space.

The final 1.5k is used to hold the character definitions in a fully exploded state. Normally in a standard Beeb these are held within the MOS ROM and may be moved into RAM (or 'exploded') when *FX20,6 is executed. This previously meant raising PAGE by &600 bytes. Once exploded the character font can be redefined, eg, to produce italic or bold text on the screen – the December 1985 issue of *AU* showed how to do this.

The next section of the private 12k is 8k long and used by paged ROMs as workspace. This was the main reason why PAGE used to be bumped up when you added certain ROMs or a disc filing system (DFS). In a standard BBC B with a DFS PAGE is set to &1900.

Even if many ROMs are fitted, the firmware supplied in the MegaROM is intelligent and will adjust its use so that ADFS and DFS will only ever use what is left over for them.



How the underside of the case looks

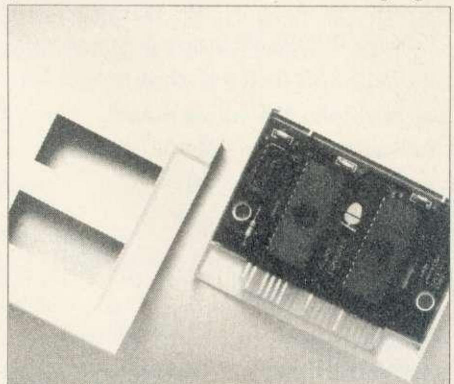
The final 256 bytes of the private RAM are again set aside for the MOS.

So what are the ramifications of all this? Well, the most obvious aspect is that when using shadow memory to display the screen there is always a full 29k of memory available to the user. Second, the problems associated with loading in programs from disc and moving them down in memory to &E00 to run are now removed.

On the negative side, I would imagine that quite a bit of software may not work because it, for example, pokes the function key buffer or character definition buffer directly. Of course, doing this is not 'legal', as Acorn has gone to pains to mention in the past.

Back to the memory map. The remaining 64k of RAM is mapped as four banks of sideways RAM, each 16k long. Using the special commands supplied in the MOS, this memory can be loaded with ROM images stored on disc. It's no coincidence that at the time of launching the Master, Acorn has announced a ROM licencing scheme. I hope that other ROM-producing houses will follow their act (and also that of Clares) in allowing bona fide use of ROMs in RAM.

Of course, these sideways RAM banks were first installed on the BBC B+ 128k and, like that machine, the Master is also supplied with BAS128. This disc-based version of Basic reconfigures the four sideways RAM banks into a single 64k block of RAM for complete use by Basic programs. This effect is only possible in Basic and not from other languages.



An EPROM cartridge

The MOS

Let's begin our look at the firmware with the Machine Operating System (MOS).

The MOS has doubled in size over the standard BBC micro – it's now 35k long and is called version OS3.2.

It incorporates advanced graphics features such as ellipse and circle drawing routines, fast flood fills, extended GCOL options giving up to six billion patterns and shades, etc. In fact the *GXR* ROM Acorn launched for the Beeb last summer has now been incorporated into the MOS as standard. Full details of this can be found in Malcolm Banthorpe's review (*Acorn User* December 1985).

There are 23 new commands in the MOS compared to the original OS1.2 and these are listed and described in table 1. As with the other MOS commands, these new ones and their associated actions are also available via corresponding OSBYTE and OSWORD calls. A whole host of new VDU commands have been added to ensure the user access to the enhanced graphics capabilities, plus more.

On the filing system front, filenames may include the filing system to which they refer. For example, the lines:

```
100 *DISC
110 LOAD "PROGRAM"
120 *NET
```

can be replaced with the single line:

```
100 LOAD "DISC.PROGRAM"
```

*NET need not be given as it remains the default filing system, but the MOS knows by

the filing system handle that PROGRAM is to be found on disc.

The cassette filing system has been extended to use OSGBPB calls 1 and 3 to get and write blocks of bytes to and from tape.

Twelve new sideways ROM service calls have been added to handle the extra facilities provided in the private RAM. Several improvements have been made with the handling of printed text, such as the addition of ASCII characters in the range 128 to 255 to the character font – these include Greek and mathematical symbols. Cursor options may also be held across mode changes and there is an optional window scroll up, down, left or right.

It is also now possible to have a pending scroll to allow the bottom right hand character to be drawn.

Extras

Several specialised commands are provided to take advantage of the sideways RAM banks:
*SRLOAD loads a ROM image file from the current filing system directly into sideways RAM.

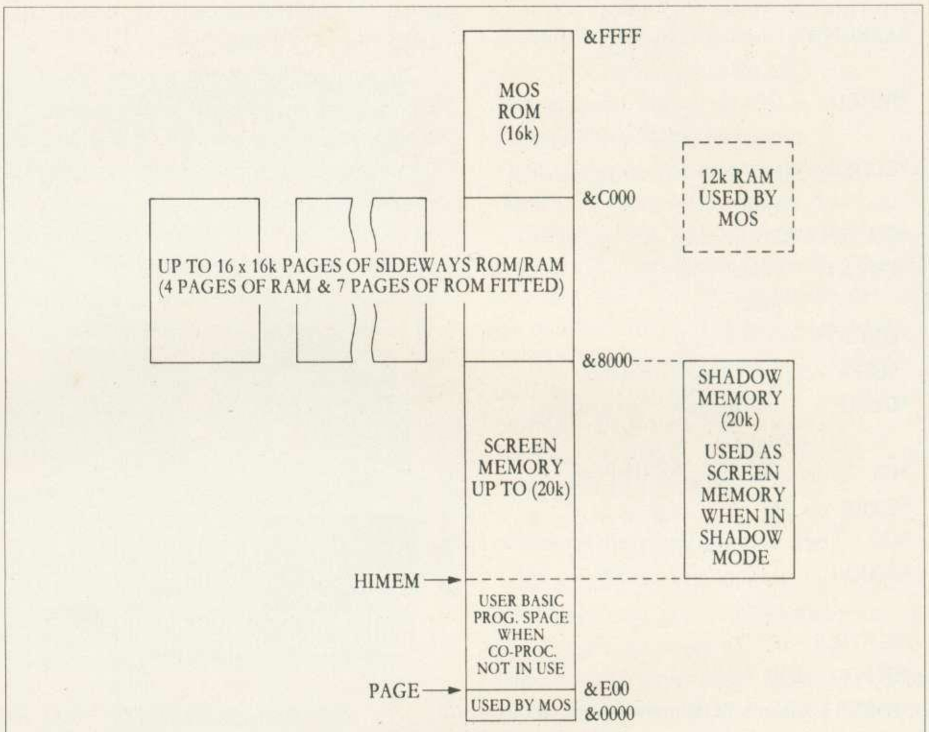


Figure 1. The Master's memory map showing how the 128k of RAM is arranged

*SRWRITE will transfer a block of main memory into sideways RAM.
*SRSAVE saves the specified bank of sideways RAM to the named file.
*SRREAD performs the reverse of *SRWRITE and saves the specified block of memory to the current filing systems.
*SRLOAD and *SRSAVE work intelligently in that they will not destroy the current contents of memory unless postfixed with a Q for a quick transfer.

Basic

The Master contains Basic 4 which offers several enhancements on Basic 2 and a few of the old bugs have been weeded out.

From a programming point of view, the most noticeable of these is that a cross reference-come-search output is now available from List – especially useful when debugging programs. In short, the specified lines will be LISTed IF a condition is met. For example:

LIST 100,200 IF A%>20

would list the lines 100 to 200 inclusive, if A% went over 20.

To take advantage of the real time clock now installed there is a new Basic command, TIME$. This pseudo variable will return a 24 byte string from the MOS. For example, the command PRINT TIME$ might print:

Fri, 14 Feb 1986.23:59:59

Auto has been adapted so that it does not now print a space after it issues a line number. Leading spaces are stripped from commands entered when a non-zero Listo option is set.

The Basic Assembler has been extended to incorporate the new enhanced instruction set of the 65C12 chip (see Martin Chaplin's article on page 91). Reference to the index registers X and Y plus A may now be in lower case, as can the EQU range of functions, bringing it in line with the rest of the mnemonic instruction set.

Editor

The Editor allows program and text to be edited very simply it includes a wide range of commands that can be used to format and operate directly on text or programs. The biggest use will be for the writing of programs. As such the Editor can be entered in two ways. To transfer a program from Basic to Edit the command EDIT is used which spools the program from Basic into the Editor. Use of the command *EDIT is limited to fresh starts as it clears the editing memory.

Once in Edit programs can be written in a friendly, easy style. The Editor is much simpler to use than the Basic Editor available for the standard Beeb. It contains several modes of

Configure CMOS RAM commands – the state of the CMOS RAM can be set for both reserved and unreserved bits. Reserved bits include:

Start-up mode	MODE <0-7,128-135>
File-Server station number	FS <0-255[.0-255]>
Printer-Server station number	PS <0-255[.0-255]>
Econet station ID	Transient Command
Start-up language ROM number	LANG <ROM>
Start-up filing system ROM number	FILE <ROM>
TV position and interlace state	TV [<Dec>[,<Dec>]
Auto-repeat delay	DELAY <0-255>
Auto-repeat rate	REPEAT <0-255>
Default printer	PRINT <0-255>
Print ignore character (no param = no ignore)	IGNORE <0-255>
Tube selected (Internal/External)	EXTUBE/INTUBE
Tube ON/OFF	NOTUBE/TUBE
Serial baud rate (both ways)	BAUD <1-8>
Serial data format	DATA <0-7>
Boot status	BOOT/NOBOOT
Scroll state (on/off)	SCROLL/NOSCROLL
Floppy-Drive params (speed, etc)	FDRIVE <0-7>
Floppy or Winchester start-up	FLOPPY/HARD
ADFS or FADFS as default	DIR/NODIR
Bell character volume	LOUD/QUIET
Caps lock on/off	CAPS/NOCAPS

FS and PS status bits only operational when ANFS fitted.

Table 2. The status bytes

Help information so that it provides all the information on the screen as and when you need it. As with the program and text editors, it contains all the commands you would expect for search and replace, finding specific items and so forth.

View, ViewSheet, DFS and ADFS

The latest version of *View* 3.0 is installed. This has one advantage over the standard *View* 3.0 on sale, in that it has a new embedded command that allows time and date stamping. This will insert the date and/or time of your letter automatically as it is printed out using ¦D or ¦T. *ViewSheet* is the standard item.

The DFS is based on the 1770 disc controller chip. When employed with ADFS it can be used in double density mode to increase total disc storage capacity to over 1.2 megabytes. A review of the 1770 DFS and ADFS can be found in last month's issue.

Terminal

Another item of standard applications firmware is the Terminal Emulator. This provides facilities needed to use the Master as either a local or a remote terminal to other computer and Viewdata systems. Obviously a modem is required to use this firmware and this can be plugged into the RS423 port at the rear or, when available, fitted internally in the space provided. (A fuller review of Terminal will appear at a later date.)

Status bytes

There are 50 bytes of RAM held within the real time clock chip (called the configuration bytes)

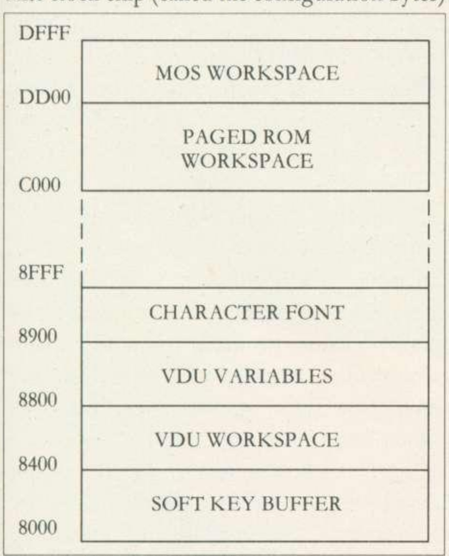


Figure 2. How Private RAM is mapped

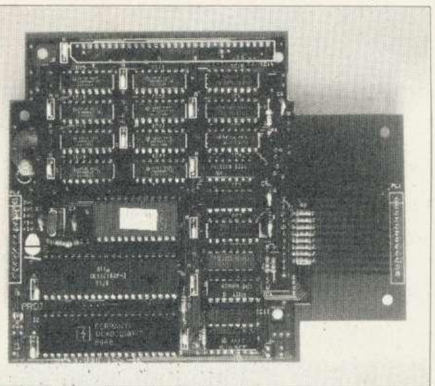
and they are organised as follows:

(a) Bytes 0 to 19 – System configuration
(b) Bytes 20 to 29 – Acorn future use
(c) Use by third party ROMs
(d) User memory

When the Master is first switched on, or when CTRL-Break is executed, the MOS checks the first 20 bytes and uses these to configure the start up of the hardware.

Obviously each byte has a predetermined function. To set or clear this function the *CONFIGURE command is used. For example, to change the volume of the internal speaker you use the command. *CONFIGURE LOUD or *CONFIGURE QUIET.

Table 2 lists the various configuration options that may be defined. A check on the status of these bytes may be made at any time



The Turbo co-processor board

using the command *STATUS which will list the state of play within these bytes.

Turbo co-processor

Upgrading the Master 128 is extremely straightforward. A popular first peripheral will undoubtedly be the Turbo board. This is, in effect, a second processor that fits inside the Master's case. To distinguish such upgrades from external second processors plugged into the Tube port, they are called co-processors.

The Turbo board is supplied with an extra 64k of RAM, and a Tube ROM all centred around an eight bit 65C102 CPU running at a lightning 4MHz. Table 3 shows how the Master 128 and Turbo upgrade demolished the *PCW* benchmarks.

Fitting the board is simple – as easy as installing a sideways ROM. The board is about the size of a paperback book and plugs into a position roughly central inside the case.

Once fitted, Turbo acts almost identically to a standard 6502 second processor. PAGE is set to &800. A Hi version of Basic and Edit are supplied on disc and these load into the machine at &B800, giving roughly 47k of programming memory free. *View* and *ViewSheet*, if required, will automatically copy across the Tube and *View* relocates itself in the co-processor.

Also supplied on the Turbo support disc is a printer buffer program. This enables you to use about 24k of memory available in the I/O processor (the Master main board in other words) as a long printer buffer – thereby allowing you to print out pages of text or programs. Once set going, you are still free to carry on programming or wordprocessing as normal with the Turbo board. The Turbo looks to be an excellent buy at £125 including VAT (not £99 as previously stated).

Econet

Schools and business users will be pleased to learn that upgrading the Master 128 with an Econet interface is just as simple. This is supplied on a small board, about the size of a cassette tape, and simply plugs into the rear right-hand corner of the machine. The only other requirement is to fit Acorn's new networking firmware, the Advanced Network Filing System (ANFS). Cost of the upgrade is just £49 including VAT.

The future

I started off by saying that I would be looking at the Master 128 in some depth and I think I have crammed in as many facts as possible. However, it has become apparent to me that I

Bench Mark	Master 128	Turbo
1	0.53	0.26
2	2.2	1.07
3	5.72	2.76
4	5.68	2.75
5	6.13	2.97
6	9.95	4.81
7	15.66	7.57
8	28.02	13.55

Table 3. How the Master 128 and Turbo performed the *PCW* benchmarks

have only begun to touch on what the Master 128 has to offer and what it is capable of – and of course there's still the Master 512 and Scientific to discuss!

Many of you will be wondering whether it is worthwhile putting your old Beebs and Electrons in their boxes and investing in a Master, and I'll look at this in our April issue.

Acorn seems to have hit the nail well and truly on the head with the Master. There will no doubt still be the sniggerers laughing at the use of eight bit technology – just as they address the memory question I kicked off with. However, my answer to them would always be 'It's not what you've got, but what you can do with it', and for my money you can do a good deal more with a Master than with any other micro around in its class at the moment.

With thanks to David and Martyn of Acorn for their help and patience!

See Acorn Forum on page 123 for details of new OSWORD, OSBYTE and service calls

LISTEN TO THE MUSIC

Tunemaker is a program that puts a music stave on screen for you to enter a tune, hear it played back, then print it out. It's a great aid to anyone learning music – or just for fun

Colin Atkins

Anyone in the early stages of learning to read music or play an instrument will probably have experienced the frustration of not knowing how a particular written phrase or melody should sound.

Timing the notes to the rhythm can be particularly tricky, and anyone other than a Mozart-type prodigy really needs to listen frequently to demonstrations of written music. In this way, the ear (or brain) gradually learns the rhythm and timing of different written note combinations.

Tunemaker is a music package ideally suited for this purpose since complete beginners can copy notes from a score, then listen to them repeatedly.

It was written on an Electron, so of course also works well on the Beeb (with one minor amendment, described in Program Notes) and with cassette or disc filing systems. If you have no special interest in music, *Tunemaker* is still a useful and entertaining sound utility.

The program enables you to copy notes from the score directly onto the screen, without naming them or entering codes. Horizontal and vertical cursors are used to select note type and pitch.

Sharps, flats and other modifications can be added and, on pressing Return, the note is printed on a stave and stored in memory. With a little practice, a simple tune can be entered in just a few minutes.

You can play the notes at any time and change the tempo (speed) over a wide range – often with amusing results!

You can, of course, enter your own composition and store up to 300 notes. This could be increased to about 500 with PAGE settings down to &E00. When finished, the master-piece can be saved to cassette or disc and loaded again later.

For programmers, the most useful facility is that all the relevant SOUND parameters for a tune can be obtained quickly and easily, for use in other programs.

The usual method of including a tune in a Basic program is to put the note parameters into DATA statements in blocks of three, (pitch, duration, gap). Disc users however, might prefer to save tunes from *Tunemaker* and call them from within a program by filename. Procedures from *Tunemaker* – PROCinitial, PROCload, PROCplay – can be used for this, with small modifications. These facilities are accessed from a menu, which you can return to by pressing Escape at any point in the program. Option one of the menu gives the tune-making program.

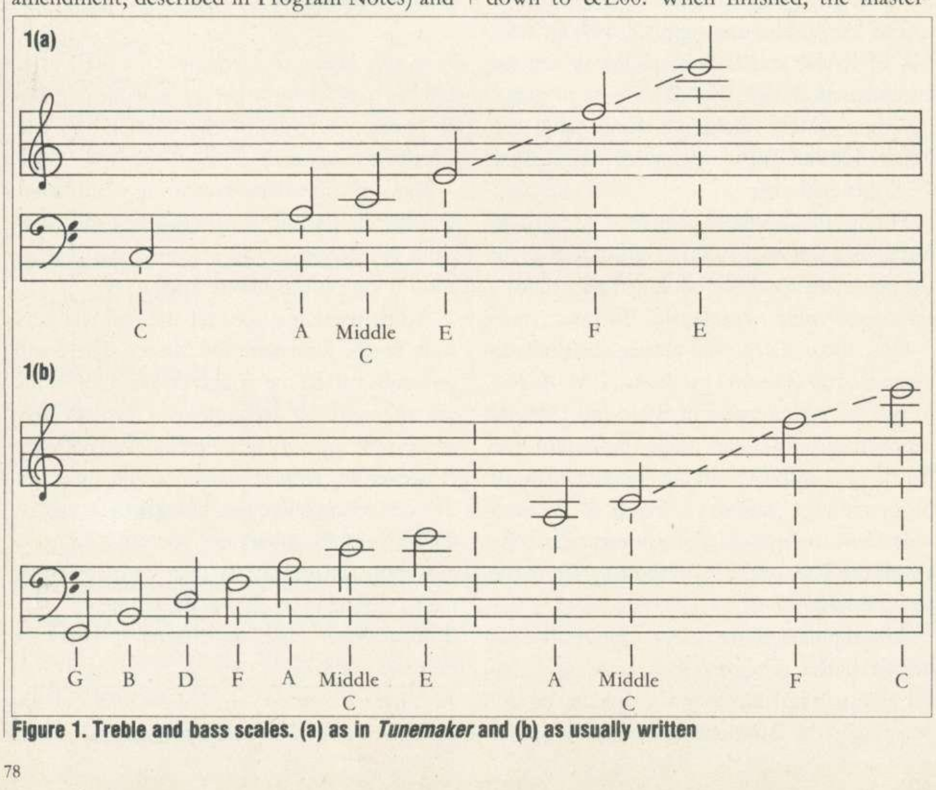


Figure 1. Treble and bass scales. (a) as in *Tunemaker* and (b) as usually written

Theory and practice

Following is some simple music theory and the way it's implemented in *Tunemaker*. Note that all key definitions are given on screen for convenience.

The pitch of a note is indicated by its vertical position on or between the five lines of a stave. Often, there are two staves to cover a large range in pitch, as shown in figure 1, with treble and bass clefs on the left of each line. Figure 1 (a) shows the range of pitch used in *Tunemaker* (more than three octaves), with their note names, letters A to G.

Note that there is room for only one line between the two staves, corresponding to the appropriately named middle C. Written music usually shows a much larger space between the staves to distinguish the melody from the bass accompaniment.

In this case, notes in the bass line which are above the bass stave, or notes in the melody which are below the treble stave are shown on short 'leger' lines, even though these may

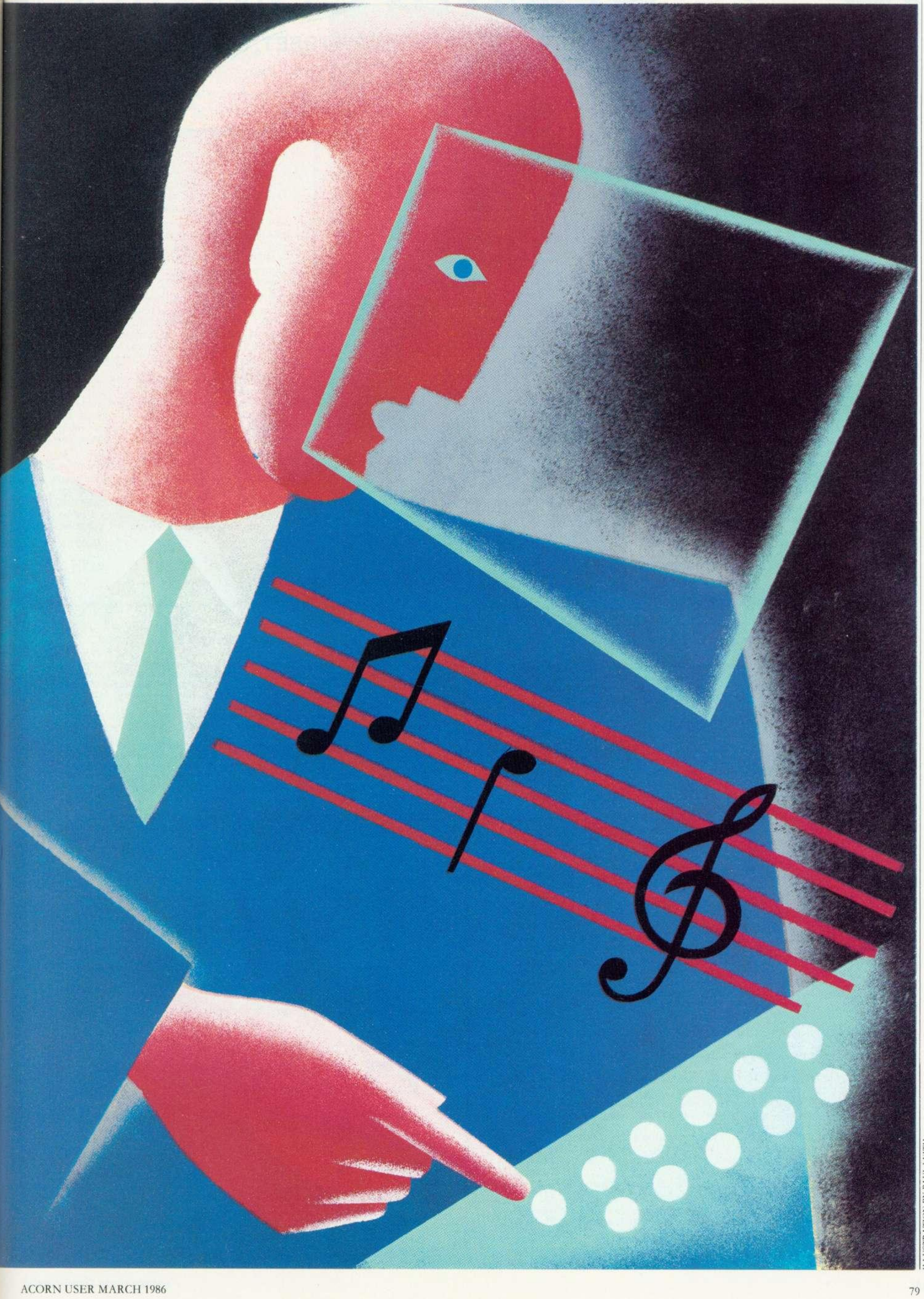


ILLUSTRATION BY PAUL LEITH

coincide with lines of the staves, as you can see in figure 1(b).

Just remember that there is still only one 'missing' line between the two staves and count the leger lines to find the note's position on the *Tunemaker* stave. Move the vertical cursor with the cursor keys to coincide with the stave line (or space) and the note selected will be printed after pressing Return. Notes falling above the treble stave will also be printed on leger lines.

Sharps and flats are used to raise the pitch of a note by one half-tone. The key signature of a piece is one or more sharps or flats, placed next to the clef and indicates that all notes of the same name must be raised or lowered in pitch as appropriate.

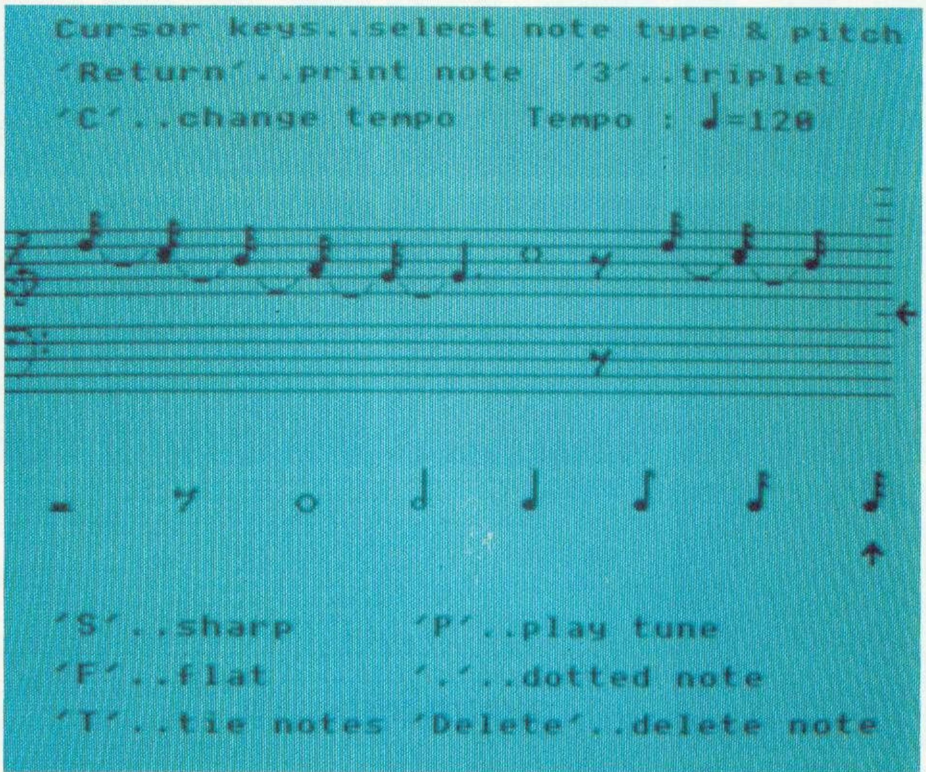
Key signatures are not entered in *Tunemaker*, so you must remember to include a sharp or flat where necessary, as you do when playing an instrument.

Sharps and flats can also occur elsewhere in a piece (accidentals) and in this case they last for the duration of that bar only, (the end of a bar is indicated by a vertical line on the stave – also not used in *Tunemaker*).

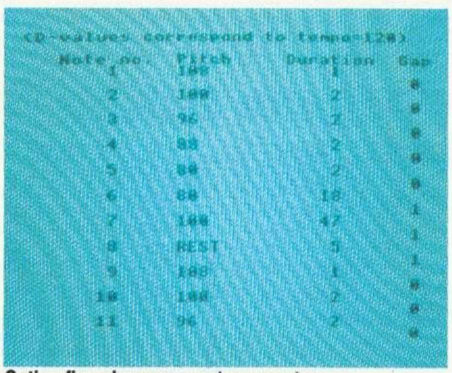
The effect of a natural is to cancel the sharp or flat and restore a note's normal pitch. In *Tunemaker*, notes always have their normal pitch unless you hit 'S' (sharp) or 'F' (flat) before pressing the Return key.

Notes must have their correct relative duration: a theoretical example is given in figure 2(a), where each succeeding note has half the duration of the previous one. The actual durations used in the program differ from these and are given in figure 2(b).

This is because notes must be separated by a short gap to make them distinct. The shortest



How the Tunemaker program (option one on the menu) appears on screen



Option five shows current parameters

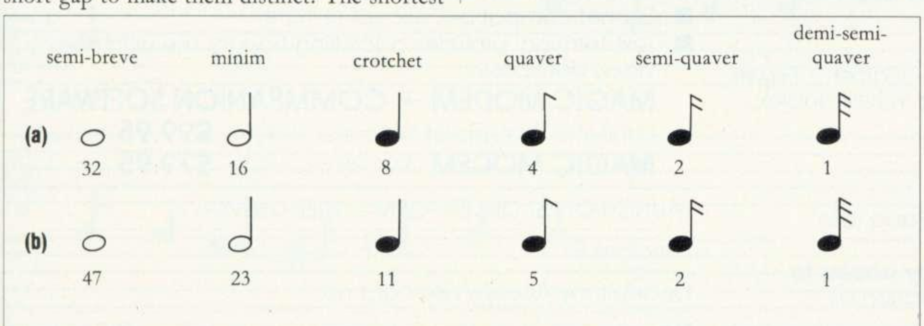


Figure 2. Note durations (in twentieths of a second). (a) theoretical and (b) *Tunemaker*

tone that can be made with the SOUND command is one-twentieth of a second and this is also the duration of the shortest gap. Therefore, it is the total note plus gap duration which is important and I find that these values maintain accurate timing.

Rests are short periods of silence and only two rests are given, (others can be made up from these). These are the minim rest and the quaver rest, having durations 23 and five respectively. Notes and rests are selected with the horizontal cursor keys. A dot placed after a note extends its duration by one-half: you should press '.' to obtain this. A 'tie' is a curved line between two or more notes of the same pitch and indicates that they must sound as one continuous note with no gap. Pressing 'T' will tie a selected note to the previous one on the stave. Sometimes, a tie is shown between notes of different pitch and this gives a 'slur' effect.

A triplet is a group of three notes with total duration of two of the same value. Press '3' for all of the three notes of the triplets and they will each have two-thirds of their normal duration. Figure 3 shows some examples of these note modifications and their durations in *Tunemaker*.

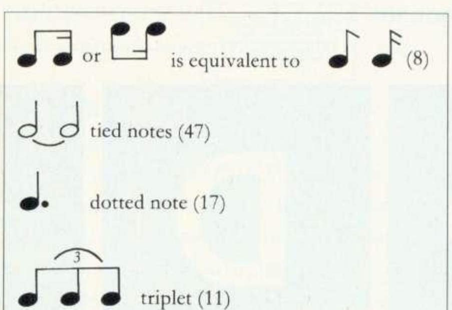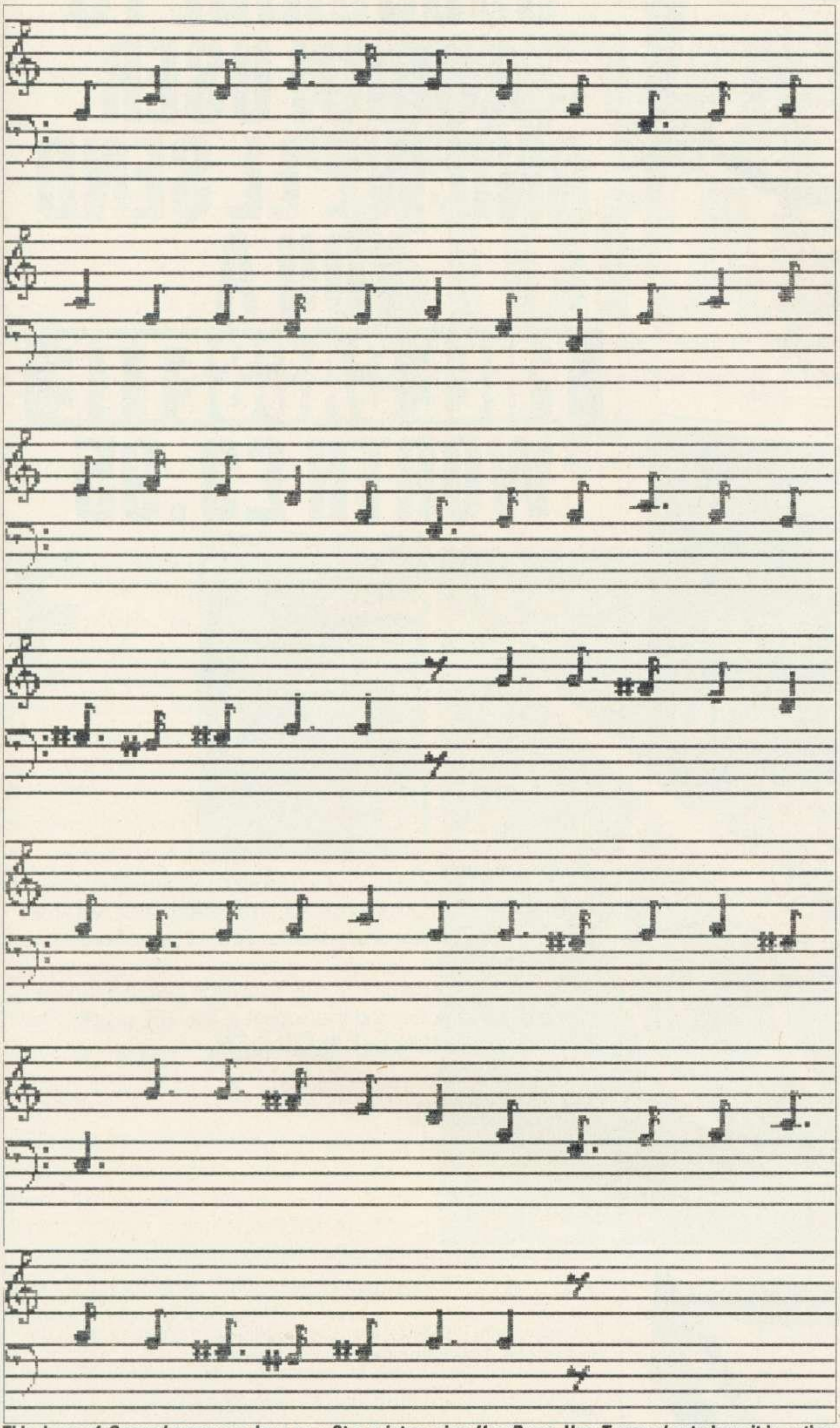


Figure 3. Note combinations with durations

When Return is pressed the note is printed on the stave along with accidentals, etc, and the note sounded. When full, the stave is wiped clean and ready for more notes. If you make a mistake, Delete will erase the note from memory and screen.

Any number of notes can be deleted in this way but you won't be able to see previous staves, so play the tune frequently, especially before the stave fills up.

'P' will play the tune at the default tempo of 120 crotchets per minute, or press 'C' and change it to any desired tempo. When finished, play the tune once more before pressing Escape to return to the menu. Don't select option one again or your tune will be cleared from memory.

Now save the tune with an appropriate filename using option three. Option five will print the pitch, duration and gap parameters;



This dump of *Greensleeves* was done on a Star printer using *UserDump*. Use *Tunemaker* to hear it in action

the durations given correspond to the default tempo of 120. If you require a different tempo, multiply these values by 100 and divide by the required tempo. Rests can be given any pitch of course, but must have the amplitude parameter set to 0.

Option four is used to re-load a tune from cassette or disc file and option two to play the tune. Again, any existing tune will be wiped from memory.

That's about all. Option six ends the program and returns to Basic. Included here is a familiar tune as a sample for you to try out.

Program Notes

The program has been tested with PAGE settings up to &1D00. With lower page settings, up to 500 notes can be stored and this is done by changing the array dimensions in line 2930 and the value of note% in line 1740.

The only change necessary for using the program with disc is to delete the cassette loading commands in lines 160 and 170.

Line 50 programs the Break key to list the program in page mode. This is necessary during programming because the Escape and cursor keys are used in the program. Pressing Break restores their normal edit functions and lists the program.

The Electron user guide says that pitch values above P=100 are not accurate. The ENVELOPE statement in line 90 introduces slight vibrato to disguise this effect. You may prefer to experiment with different envelopes.

BBC micro users should add one to all DATA values in PROCscale for correct pitch.

Printer-on (VDU2) and printer-off (VDU3) can be added in PROCdata if required.

Procedures

PROCerror – error trap
PROCintro – introductory page
PROCchars – character definitions
PROCmenu – access to program facilities
PROCscreen– draws staves, clefs, etc
PROCinitial – initialises variables
PROCselectnote – loop to move cursors and set of flags
PROCprintnote – prints note on stave
PROCstorenote – stores and sounds note selected
PROCdelete – deletes last note from screen and memory
PROCycurs – moves vertical cursor
PROCleger – draws leger lines
PROCtie – prints tie

Variables

opt% – menu option
note% – number of current note
ystave%, ys% – vertical position of stave line
line% – stave line number
Y%, oy% – current and old position of vertical cursor
H%, oh% – current and old position of horizontal cursor
X% – horizontal print position of note
nb%, nt% – note bottom, note top
dur% – note duration
pitch% – note pitch
leg% – leger line number
key$ – keyboard input

Flags: sharp%, tie%, flat%, dot%, return%, gap%, triplet%, notune%

Arrays

P% (300) – pitch
D% (300) – duration
V% (300) – volume
G% (300) – gap
scale% (25) – note scale

The Tunemaker listing is on yellow pages 109 to 112

SIDEWAYS STORAGE

You can run longer programs in your micro with or without an expensive second processor – moving variables, text and subroutines to sideways RAM is the answer

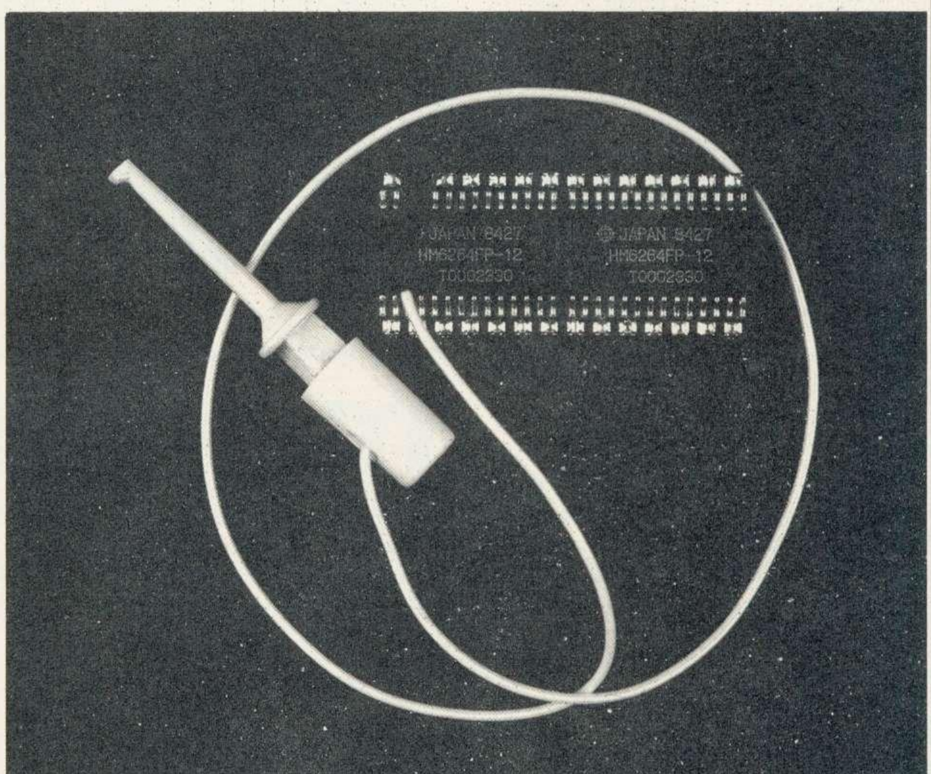
Mike Rawlings

Extra memory provided by sideways RAM boards is useful not just for utilities, new commands or printer buffers but also for running longer programs. The dreaded 'No room' message can be cured by a second processor, but a cheaper answer is to move variables, text and even Basic subroutines into sideways RAM. This article presents utilities which use sideways RAM from *Acorn User*'s UserRAM and Solidisk's boards for data storage with or without a 6502 second processor.

A future issue will contain a program to shift Basic or machine code subroutines and programs, as well as text and data files, into sideways memory.

Acorn's variable storage system is fast but heavy on memory, especially with strings. Memory use is cut down by accessing memory locations directly using the '?', '!' and '$' indirection operators. Sideways RAM can be accessed in much the same fashion, using a few short machine code routines. Listing 1 for users of *Acorn User*'s UserRAM includes routines for reading and writing bytes, integers, floating points, and strings directly. (Listing 2 is the Tube-compatible version.)

Listings 2 and 4 give amendments to the UserRAM programs, and are applicable only to Solidisk hardware when access to more than one RAM bank is required.



***Acorn User*'s UserRAM board can be used for data storage to help you run long programs**

Direct access

Listing 1 for the UserRAM accesses registers and sideways memory directly and so will not work on the second processor. The code is assembled in the main program area, space being allocated by the DIM statement at line 150. This code could be assembled anywhere, &A00 being the most obvious place for disc users. Simply alter lines 150 and 170.

```
150 DIM string 256
170 P% = &A00
```

This will alter the checksum values, so check the listing as it is printed before changing the code address.

The routines use workspace &90 to &98 leaving the normal zero page workspace free, although Econet users will have to alter this, probably to &70 to &78. Included in the listing are example starting points for data as well as a simple demonstration of how to use the routines.

The code is only 120 bytes long and the whole routine can be reduced to just over 1k, once the REM statements and extra spaces are removed, variable names shortened and the code put on multi-statement lines. It is, however, most unwise to try to shrink the program any further by *LOADing the code directly as it includes locations which depend on the value of LOMEM. You must be especially careful to make 'A' the first variable declared in any program which uses these routines, as this is the temporary storage place for all floating point variables (line 70).

Acorn User's UserRAM can be installed in any spare sideways ROM socket, or bank, on the BBC B or B+, so make sure the variable 'bk' is set to the correct socket number (line 80). Lucky readers with more than one bank of sideways RAM can alter the value of &92 to the appropriate bank number in any of the procedures or functions instead of using the variable 'bk'. Strings could be organised in one bank, floating points in another, and so on.

The example byte starting value (&8010) in

line 90 is the lowest value used for all types of data, because &8000 to &8006 are used by the operating system to recognise the type of ROM in each bank, so data stored at these locations could be misinterpreted. Data is accessed as an offset of a base address using 'n' as the offset pointer:

Byte address = b+n (one byte per variable)

Integer address = t+n*4 (four bytes per variable)

Floating point address = f+n*5 (five bytes per variable)

String address - s+n*len (length of string+1 per variable)

This is far less wasteful of memory than Basic's variable handling system, and is handy whenever large amounts of data need to be processed (with or without sideways RAM). This program can in fact be used without alteration for reading and writing variables directly into the main memory, not just sideways RAM, though be careful to steer clear of areas of memory already in use.

Floating point

For example, if the floating point base address ('f') was &9000, the value 32.567 could be written into floating point variable number five (stored at &9000+5*5) using:

PROCf(5,32.567)

and read using X=FNf(5). Similarly, if the string base address ('s') was &8500 and the maximum length of string was 20 characters (len=21), the string 'Testing123' could be written into string variable number 155 (stored at &8500+155*21) using:

PROCs(155,"Testing123")

and read using:

PRINTFNs(155)

Large blocks of data stored in sideways RAM can be saved very rapidly using the routine by Richard Harris published in June's *Acorn User* (page 102), and *LOADed even more rapidly directly into sideways RAM.

Solidisk users have the choice of up to eight banks (numbers eight to 15) and will have to amend lines in listing 1 to read as in listing 2 if they wish to access sideways RAM banks other than number 15. The Solidisk method of writing to these is to use user port registers &FE60 and &FE62 (lines 1100-1170), in fact the board is connected to the user port and effectively disables it.

In all other respects this works exactly as the UserRAM version, including the ability to access normal RAM areas, and should be used in the same way.

The Solidisk version will not, as far as I know, work with other manufacturers' hardware, though I have no doubt that this method of data storage could be revised for other sideways systems. Perhaps readers will be able to provide modifications.

Listing 3, for UserRAM, works on the same principle as listing 1, but is Tube compatible, and uses OSWORD and OSBYTE calls. Instead of accessing memory directly, the code is stored below PAGE (&800) at &260 using workspace &250 to &25D (addresses only available on the 6502 second processor), thereby leaving zero page free. If the code and workspace were relocated this program would work quite happily without the 6502 second processor but as the code is longer I see little point in this.

A bonus is that these routines can be used to access input/output (I/O) memory giving an extra 23.25k of memory for variable storage (&1F00 to &7C00 in mode 7).

This can be extended to 24.75k after a *FX20,0 command (&1900 to &7C00), thus reducing the memory allocated to character definitions and lowering OSHWM (operating system high water mark).

The second program for Solidisk boards (listing 3 on the yellow pages amended with listing 4) is Tube-compatible. For lucky people with 128k add-ons there is a possible maximum of 152.75k of variable storage space (including I/O processor areas), all of which can be accessed with this program.

Readers who are desperately short of space can adapt the integer read/write routines to handle two-byte or three-byte variables, using alternative lines given in the yellow pages. But remember that these altered routines will only handle positive integer numbers – the largest two-byte number being 65535, and the largest three-byte number 16777215.

Available addresses

Finally, the available sideways RAM addresses are:

8k RAM &8010 to &9FFF

16k RAM &8010 to &BFFF

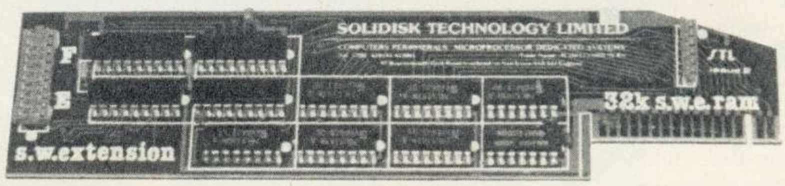
A future issue will present a program that uses the ROM filing system to move much more than data into sideways RAM and leave more space for even longer programs.

Jargon Box

Sideways RAM: A RAM chip or circuit board containing RAM chips which is inserted into a sideways ROM socket and into which ROM images may be loaded from disc or tape.

Sideways RAM bank: An area of sideways RAM which may consist of one or several sideways RAM chips. The *Acorn User* UserRAM is an example of a 16k sideways RAM bank.

Zero page: The first 256 bytes of the memory. These bytes have addresses from &00 to &FF and are shared between the operating system, languages such as Basic, and filing systems like the Disc Filing System and the Network Filing System. A few bytes of zero page (from &70 to &8F) are set aside for the user to use.



The listings for the Solidisk sideways RAM boards could be adapted for use on other boards

Procedures and Functions

PROCb(n,v): write one byte

FNb(n): read one byte

PROCt(n,v): write an integer (four bytes)

FNt(n): read an integer (four bytes)

PROCf(n,v): write a floating point number (five bytes)

FNf(n): read a floating point number (five bytes)

PROCs(n,$string): write a string (length of string + one byte)

FNs(n): read a string (length of string + one byte)

Variables

float: address of temporary storage for floating points

bk: bank number

b: base address for byte storage

t: base address for integer storage

f: base address for floating point storage

s: base address for string storage

len: maximum length of string + 1

code: address at which code is assembled

string: address of temporary storage for strings

You'll find Mike Rawlings' four listings allowing you to store data in sideways RAM on yellow pages 112 to 116 of this issue

THE LAST DETAIL

The last word in picture detail, this pixel editor ensures that your graphics are as clean and clear as possible

Mike Williams

I use several drawing programs on my BBC micro, but find that none of them gives me the fine control that I need to deal with important details. So I have written a graphics editor which will read a screen-image file and edit it pixel by pixel to sharpen up my graphics.

The graphics screen is divided up into a large number of tiny rectangles called pixels. In mode 0 there are 640 by 256 pixels; in modes 1 and 4 there are 320 by 256 pixels; and in modes 2 and 5 there are 160 by 256.

This means that the pixels are different sizes

Important variables

store%: size of buffer for holding pixels
base%: location of pixel buffer
M%:mode
h%,w%: size of magnified pixel
magnif%: magnification
WX%,WY%: size of window
X%,Y%: position in main screen
x%,y%: position in pixel editing screen
K%: key pressed

in the various modes – in mode 0 a pixel is 2 by 4 'graphic units', in modes 1 and 4 it's 4 by 4, and in modes 2 and 5 it is 8 by 4 graphic units.

This program magnifies an area of the screen, so that the individual pixels become large enough to be seen.

A cursor can then be moved to select an individual pixel that is in the wrong colour and allows it to be changed. The alterations made to the magnified part of the screen are then copied back onto the screen image. I find this useful for tidying up graphic images, particularly for details such as eyes.

The program on the yellow pages saves the current screen image to a temporary disc file called P.WORK while the screen is being used in editing mode, then re-loads the screen image and applies the changes.

The reason for using a disc file in this way is that there is not enough memory space in a standard BBC micro to hold the screen image in memory, while using the screen memory area for the magnified display.

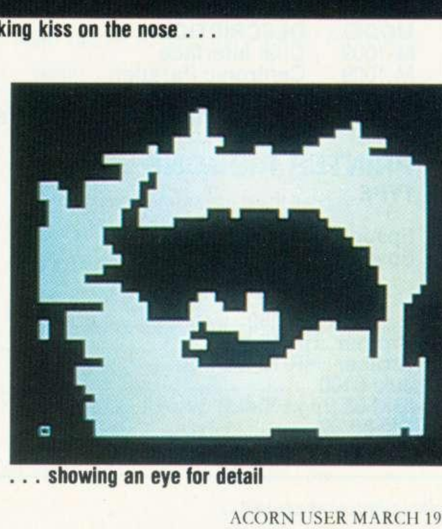
The program presented here could be converted to run without discs on a machine with extra memory (eg, sideways RAM, second processor or shadow RAM) by replacing the



Snoopy gives poor ol' Charlie Brown a great big smacking kiss on the nose . . .



Portrait of a smiling man . . .



. . . showing an eye for detail

*LOAD and *SAVE commands by routines to copy the screen memory to and from the additional memory area.

The program will operate on a screen image in any of the graphics modes (0, 1, 2, 4 or 5) that have been saved with the command:

*SAVE file 3000 8000

for modes 0, 1 and 2 or

*SAVE file 5800 8000

for modes 4 and 5.

Most drawing programs you'll come across have a screen save option which saves the screen in this manner.

It's possible to start the editor with a totally blank screen in the selected mode, by just hitting Return when asked for a filename.

However, the pixel editor program really comes into its own when used for tidying up images which have already been created by other graphics programs.

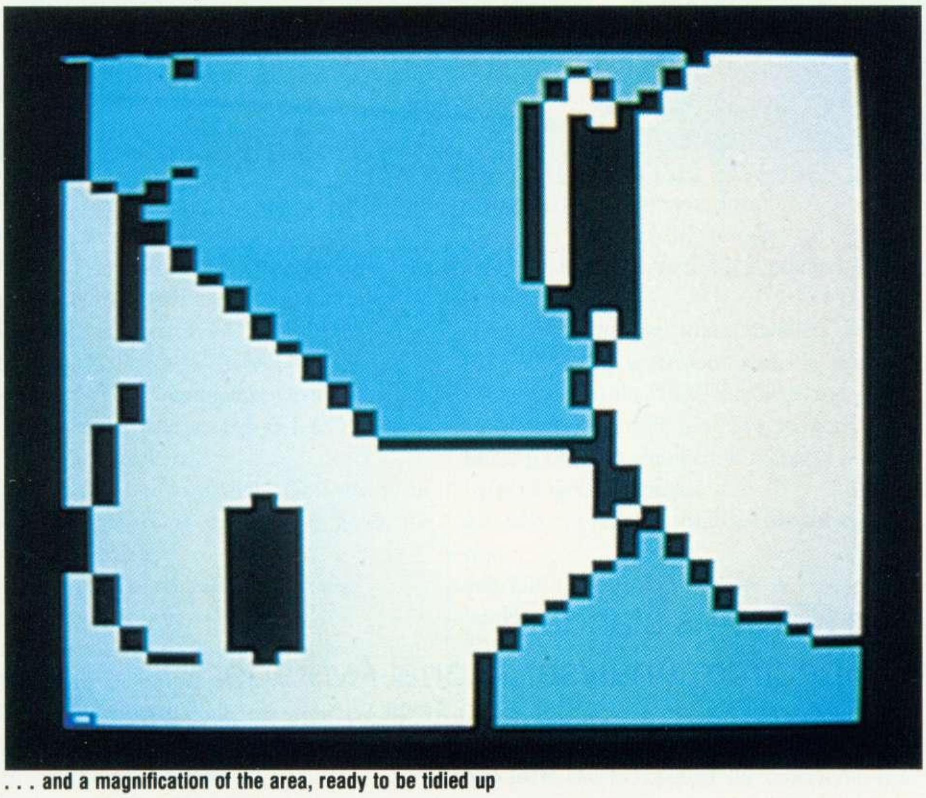
You could load screens created with the *Paintbox* software presented in *Acorn User* February '85, *Super Painter* (*AU* January '86) or even a digitised picture.

The section of the screen being edited is copied into a buffer while changing from screen image mode to pixel editing mode. The size of this buffer controls the area of the screen which can be edited at one time.

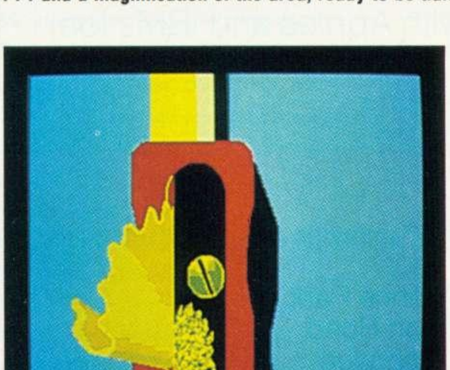
As written, the program will run with PAGE set to &1900: users with PAGE greater than &1900 may need to decrease the size of the buffer, by altering the value of 'store%' in line 80. This decreases the area of the screen which may be edited at a time.

I have included two checks to assist less than expert typists, on lines 940 and 1650 which should help to minimise the damage caused by mis-typing the program.

When the program is finished, the final result will be held in the file wkfile, and should be renamed by using *RENAME, otherwise it will be overwritten when the pixel editor is next run.



. . . and a magnification of the area, ready to be tidied up



The pencil's sharpened . . .



. . . it's the screw's turn now

Procedures

PROCdist: main screen handler
PROCcopydown: copy from screen to pixel buffer
PROCcopyup: copy from pixel buffer to screen
PROCclose: pixel editing screen handler
PROCdisplay: copy from pixel buffer to editing screen
PROCbox: draw main screen window
PROCcursor: draw editing screen cursor
PROCcolour: change the colour of one pixel

Controls

Screen image mode:
Cursor keys: move window
Shift + cursor keys: move window faster
Return: enter editing mode
Copy: exit, leaving a final copy of the screen image in wkfile.

Editing mode:
Cursor keys: move cursor
0-9, A-F: new colour for current pixel as follows

Key

Modes 0,4

0	black
1	white

Modes 1,5

0	black
1	red
2	yellow
3	white

Mode 2

0	black
1	red
2	green
3	yellow
4	blue
5	magenta
6	cyan
7	white
8	fl. black/white
9	fl. red/cyan
A	fl. green/magenta
B	fl. yellow/blue
C	fl. blue/yellow
D	fl. magenta/green
E	fl. cyan/red
F	fl. white/black

(Note. All 15 colours are available only on mode 2. In other modes there is a wrap around effect, for example, in mode 0 only the colours black and white are available – pressing other keys will give either black or white.)
Return: return to screen image mode

Mike Williams' Pixel Editor listing is to be found on yellow pages 116 and 117

6502 SPECIAL

Presenting a program to extend the powerful HiBasic assembler in the 6502 second processor. Plus you can learn about the Master's new assembler instructions

Martin Chaplin

Acorn's 6502 second processor for the BBC micro comes with an improved version of the 6502 central processor chip, the 65SC02, which runs at 3MHz (50 per cent faster) and contains extra instruction codes. Another improved chip, the R65C02 from Rockwell has even more instructions and may replace the 65SC02 within the second processor. The program presented here allows mnemonics for all these codes to be included within a Basic program, giving access to the powerful HiBasic assembler. It also includes a further EQU pseudo-operator, EQUR, which enables the inclusion of real numbers within a machine code assembly in a similar manner to EQUB, EQUD, EQUW and EQUS for bytes, words, four-byte integers and strings. The additional assembler instructions are outlined below.

HiBasic runs in user memory (unlike Basic in the BBC micro which is in a ROM chip), and so allows HiBasic code to be changed or extended. The only difficulty is where the extra coding should be inserted within HiBasic. The new code is then entered by jumping from HiBasic, returning to a new position after running. In this way, most extensions to the assembler can be simply achieved, but in one case it was not possible because new branch instructions (BBR and BBS) were needed to determine the branch offset. Although, naturally enough, HiBasic determines this offset, it does so within the main flow of the code and not by use of a specific subroutine.

To simplify and shorten the code necessary to assemble these mnemonics, the HiBasic

PROGRAM NOTES: HIBASIC EXTENDED ASSEMBLER

This program should be run in the 6502 second processor under HiBasic. The machine code generated is automatically saved, with the correct reload and execution addresses, as X_HIBAS in directory M. This may be run by *RUN M.X_HIBAS <Return>.

160-170: HiBasic interprets the byte pointed to by the address held in &B and &C plus the offset held in &A
180-200: &2A onwards hold the bytes to be put in the machine code; &2A holds the opcode if needed
210-230: parts of the real number store
240: temporary store
250: assembles a one-byte instruction
260: returns on proper assembly
270: rejoins branch code, allowing the BRA (branch always) instruction
280: gets branch address
290: assembles a two-byte instruction
300: rejoins immediate-addressing code
310: rejoins HiBasic code
320: rejoins indexed-addressing code
330: rejoins absolute-addressing code
340: rejoins BIT code
350: rejoins assembler
360: rejoins INC/DEC code
370: rejoins CPX/CPY code
380: assembles a three-byte instruction
390: gives 'index error' message
400: evaluates an integer expression
410: gets the next byte pointed to by (pointer), offset
420: gives 'type mismatch' error
430: gives 'syntax error' message
440: evaluates the expression pointed to by (pointer), offset
450: converts integers to real numbers
520-750: EQUR extension: works in a similar manner to the other EQU directives and puts a real number into the next five memory locations. A one-byte exponent is followed by four bytes of signed mantissa
620-660: ensures the mantissa has the correct sign
680-730: stores the five bytes in the opcode buffer
740-750: sends five bytes back to HiBasic for assembly
760-850: gets unrecognised mnemonic, converting to upper case
860-1010: checks whether the mnemonic is a new one and gives an error message if it is unrecognised
1030: X contains the mnemonic's position in the table
1070: One-byte instructions, PHX, PHY, PLX and PLY
1110-1470: BBR, BBS, RMB and SMB mnemonics. These are used by the R65C02 chip but are not implemented in the G65SC02 which comes with the second processor
1130-1210: ensures that the first parameter is below eight and then multiplies it by 16 to get the opcode offset
1290: assembles the two-byte instruction for set/reset memory bits in zero page (RMB and SMB)
1360-1420: get the position of the branch (less one to allow for three-byte instruction, BBR and BBS)
1550-1600: test and set/reset memory bits (TSB and TRB)
1610-1880: stores zero code (STZ)
1880-2070: table of new mnemonics and their base opcodes
2080-2170: new indirect addressing modes, eg, AND (zero page)
2180-2300: allows immediate addressing mode for the BIT instruction. This is incompletely implemented on the G65SC02 chip
2310-2490: allows accumulator addressing for the INC and DEC mnemonics
2500-2670: new indexed-indirect addressing mode for the JMP instruction, ie, JMP (absolute address, X)
2700: change the base byte for the BIT instruction in the HiBasic assembler
2710-2930: rearranges the branch code in HiBasic to allow branch extensions
2940-3170: arrange jumps from HiBasic
3180-3230: set new HIMEM
3270-3340: PROCsave; checksum and saves machine code. The checksum is correct for HIMEM set to &B800 (default) prior to running program
3360-3470: FNBRA and FNPHX assemble new instructions before the extended HiBasic assembler becomes operational

code is converted to include a subroutine determining the branch offset. This subroutine has been called both by the original HiBasic and the introduced extended code. This has, however, meant a more extensive change in the 'branch' code (&BEAD-&BED8) than was originally intended and necessitated the abbreviation of the error message 'Out of range' to simply 'Range'. Another necessary change was to alter the base opcode byte for the BIT instruction so it could use the same code as used by other instructions to determine its opcodes for extended addressing modes.

The new mnemonics, with their base opcodes, are held in a table within the newly-generated machine code. The code that accesses this table is entered when HiBasic finds an unrecognised mnemonic. The three-byte mnemonic is first recovered from the Basic program and then compared with the 12 new mnemonics in the table. If a match is found, the position in the table (indexed by X) determines the relevant code to be used. If no match is found, control returns to the HiBasic error message 'Syntax error'.

The code generated by this program, which incorporates some of the new instructions, is specific for the current version of HiBasic as it uses jump instructions into and out of language code. However, as the final version is saved to disc, it can be used with any future versions.

ADDITIONAL ASSEMBLER INSTRUCTIONS

BRA

Branch always using next byte as a relative displacement

Addressing	Opcode	Bytes	Cycles
BRA label	&80	2	3,4 or 5

Operation: The byte following the opcode is added in two's complement form to the program counter and execution of the program is transferred here. As with the other branch instructions, the displacement must be +127 to −128; the label +129 to −126 from the branch instruction. It does not affect any flags and avoids contrived (eg, 'SEC:BCS label') and unnecessary jumps ('JMP absolute').

STZ

Store zero at the specified address

Addressing	Opcode	Bytes	Cycles
STZ zero page	&64	2	3
STZ zero page,X	&74	2	4
STZ absolute	&9C	3	4
STZ absolute,X	&9E	3	5

Operation: A zero is stored at the location specified. The status register is not affected.
Applications: They are used to avoid using a register to simply hold zero when clearing memory, eg:

```
        LDX #0
        LDA #0
.label  STA absolute,X
        DEX
        BNE label
```

can be replaced by:

```
        LDX#0
.label  STZ absolute,X
        DEX
        BNE label
```

which is faster, shorter and does not affect the accumulator register.

PHX

Push X register onto stack

Addressing	Opcode	Bytes	Cycles
PHX	&DA	1	3

Operation: The contents of the X register are placed onto the top of the hardware stack and the stack pointer is decremented by one.

PHY

Push Y register onto stack

Addressing	Opcode	Bytes	Cycles
PHY	&5A	1	3

Operation: The contents of the Y register are placed onto the top of the hardware stack and the stack pointer is decremented by one.
Applications: The instructions PHX and PHY can be used for simply saving the registers to the stack (eg, 'PHX' and 'PHY' rather than 'TXA:PHA' and 'TYA:PHA'). There is a saving in both memory and time when using these instructions.

PLX

Pull X register from stack

Addressing	Opcode	Bytes	Cycles
PLX	&FA	1	4

Operation: The top byte is pulled from the stack and placed into the X register. The stack pointer is then incremented by one.

PLY

Pull Y register from stack

Addressing	Opcode	Bytes	Cycles
PLY	&7A	1	4

Operation: The top byte is pulled from the stack and placed into the Y register. The stack pointer is then incremented by one.
Applications: The instructions PLX and PLY can be used for recovering the registers from the stack (eg, 'PLX' and 'PLY' rather than 'PLA:TAX' and 'PLA:TAY'), or exchanging registers (eg, 'PHX:PHY:PLX:PLY'). There is a saving in both memory space and time using these instructions.

TSB

Test and set bit

Addressing	Opcode	Bytes	Cycles
TSB zero page	&04	2	5
TSB absolute	&0C	3	6

Operation: These instructions test and set bits in the memory location specified. TSB logically ORs the memory location with the accumulator. The result is stored back at the specified memory location, and the Z (zero) and N (negative) flags are set in the flags register. Thus TSB ensures that certain bits corresponding to the bits set (=1) in the accumulator are set (=1) in the memory location, eg:

```
        LDA #mask_byte
        ORA absolute
        STA absolute
```

may be replaced by:

```
        LDA #mask_byte
        TSB absolute
```

as both make the bits of the memory location 'absolute' equal to one where they correspond to set bits (=1) in the mask_byte.

TRB

Test and reset bits

Addressing	Opcode	Bytes	Cycles
TRB zero page	&14	2	5
TRB absolute	&1C	3	6

Operation: TRB has the opposite effect to TSB so that bits set (=1) in the accumulator are reset (=0) in the memory location, eg:

```
        LDA #mask_byte
        EOR #&FF
        AND absolute
        STA absolute
```

can be replaced by:

```
        LDA #mask_byte
        TRB absolute
```

as both make the bits of the memory location 'absolute' equal to zero where they correspond to set bits (=1) in the mask_byte. As above for TSB, the flags register is affected (N and Z) by the result put into the memory location. In both cases (TSB/TRB) the rest of the memory location and the accumulator are unaffected by the instruction.

ADDITIONAL ASSEMBLER ADDRESSING MODES

Miscellaneous

Addressing mode	Opcode	Bytes	Cycles
ORA (zero_page)	&12	2	5
AND (zero_page)	&32	2	5
EOR (zero_page)	&52	2	5
ADC (zero_page)	&72	2	5
STA (zero_page)	&92	2	5
LDA (zero_page)	&B2	2	5
CMP (zero_page)	&D2	2	5
SBC (zero_page)	&F2	2	5

This indirect addressing mode was only available for the jump ('JMP (zero_page)') instruction in the 6502 microprocessor. The instruction operates on the memory location pointed to by two zero page addresses ('zero_page' and 'zero_page + 1'). Thus, it is useful as an alternative to the indirect indexed addressing modes (eg, 'LDY#0:STA(zero_page),Y' may be replaced by 'STA(zero_page)' saving memory and execution time). The flags register is affected similarly to the other addressing modes of these instructions.

BIT

Test BIT in memory

Addressing mode	Opcode	Bytes	Cycles
BIT zero_page,X	&34	2	4
BIT absolute,X	&3C	3	4
BIT immediate	&89	2	2

These are extra addressing modes for the BIT instruction (BIT sets the Z flag if the accumulator equals the BIT operand and additionally sets the V (overflow) and N flags to the bits 6 and 7 of the operand). The indexed addressing modes are useful for checking tables of bytes as the N, V and Z flags are set in the flags register. The BIT immediate instruction only sets the Z flag (not the N and V) in the 65SC02 due to a bug in the hardware.

INC A

Increment accumulator by one

Addressing mode	Opcode	Bytes	Cycles
INC A	&1A	1	2

Operation: The accumulator's contents are incremented by one. The N and Z flags are affected by the operation. The carry flag remains unchanged. If the accumulator contained &FF it becomes zero, eg:

```
CLC:ADC#1
```

may be replaced by:

```
INC A
```

which is shorter, faster and does not change the carry (C) flag. Note that some data sheets refer to this instruction as INA.

DEC A

Decrement accumulator by one

Addressing mode	Opcode	Bytes	Cycles
DEC A	&3A	1	2

Operation: DEC A subtracts one from the accumulator; if it was zero, it becomes &FF (eg, 'SEC:SBC#1' may be replaced by 'DEC A' which is shorter, faster and does not change the carry flag). As with their other addressing modes these instructons change the N and Z, but not the carry flag, in the flag register. Some data sheets refer to this instruction as DEA.

NEW ADDRESSING MODE

Pre-indexed absolute indirect

This is a totally new addressing mode for use with the JMP instruction. It is similar to the existing pre-indexed indirect mode but using absolute rather than zero page addresses.

Addressing mode	Opcode	Bytes	Cycles
JMP(absolute,X)	&7C	3	6

Operation: The instruction allows a jump to the address held in locations 'absolute + X' and absolute + X + 1'. It is particularly useful in jump tables, eg:

```
LDX #index
LDA table,X
STA absolute
LDA table+1,X
STA absolute
JMP(absolute)
```

may be economically replaced by:

```
LDX #index
JMP(table,X)
```

ADDITIONAL ASSEMBLER INSTRUCTIONS, R65C02 ONLY

SMB/RMB

Set or reset bit in zero page memory

Addressing mode	Opcode	Bytes	Cycles
SMB bp,zero page	&87+(bp*10)	2	5
RMB bp,zero page	&07+(bp*10)	2	5

NB: bp = bit position

Operation: These instructions set (=1, SMB) or reset (=0, RMB) bits within a zero page memory location. The opcode depends on the bit position. For example, to set the bits in 'zero page' starting from the lowest would use the opcodes &87, &97, &A7, &B7, &C7, &D7, &E7 and &F7. In the assembler the bit position must be between 0 and 7.

Applications: The main use for these instructions is to set up (tables of) flags in zero page to be used in conjunction with the next instructions.

BBS/BBR

Branch if bit set/reset

Addressing mode	Opcode	Bytes	Cycles
BBS bp,zero page	&8F+(bp*10)	3	5,6 or 7
BBR bp,zero page	&0F+(bp*10)	3	5,6 or 7

NB: bp = bit position

Operation: These are new branch instructions. They cause a relative branch to the label depending on whether a bit was set (=1, BBS) or reset (=0, BBR) in a zero page location. The displacement must be in the range −128 to +127 (−125 to +130 from the branch instruction). The opcodes depend on the bit position (0-7) involved, as for the RMB and SMB instructons.

ADDITIONAL PSEUDO-OPERATOR

EQUR real-number

This pseudo-operator behaves similarly to the other pseudo-operators EQUB, EQUW and EQUD. It reserves five bytes of memory into which it places a real floating-point number (real_number). The first byte contains the exponent and the next four bytes contain the signed mantissa. The number is 'packed' with the most significant bit of the mantissa holding the sign flag. Integers are changed to real numbers using this pseudo-operator.

You'll find Martin Chaplin's listings on yellow pages 117 to 120

Master set

Acorn's new micro, the Master 128, is based around the 65C12 microprocessor chip. This has an identical instruction set to the 65C02 microprocessor chip, and so all the new instructions detailed here are relevant to the Master. However, the Basic 4 assembler includes the new instructions and so they can be used directly and without the need for the patch program detailed here.

To summarise, the new instructions supplied as standard on the Master are as follows.

Previous instructions with additional addressing modes:

ADC, AND, BIT, CMP, DEC, EOR, INC, JMP, LDA, ORA, STA

New instructions:

BRA, PHX, PHY, PLX, PLY, STZ, TRB, TSB

COMPETITION

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Bruce Smith



Here's your chance to win a copy of the latest ROM-based language from Acornsoft – MicroProlog (reviewed on page 172). It is a logic programming language that puts the world of artificial intelligence in your grasp. Write your answers to the following language-biased questions on the back of a postcard or sealed envelope and send them to arrive at the *Acorn User* offices no later than Friday March 21 1986. Don't forget to include the coupon below. The first three correct answers pulled out of the hat will win a MicroProlog package worth £79.95 each.

1. What do the initials AI stand for?

2. What does BCPL stand for?

3. What number sounding language did Charles Moore invent?

4. Is *View* a language?

5. What language uses a turtle?

6. Is ISO Pascal compiled or interpreted?

7. What is the Common Algorithmic Language?

8. What list processing language makes extensive use of brackets?

9. Is CP/M a language or an operating system?

10. Does a language need to be in a ROM for it to work correctly on an Acorn micro?



Mr Spock as seen by October's first prize of a video digitiser. The results are given below

OCTOBER AND NOVEMBER WINNERS

October's first prize of a video digitiser and lightpen is bound for the home of Beryl Orchard of Winchester. Beryl suggested that the digitiser could be used to photograph the mouths of deaf children making particular sounds. These pictures could be superimposed over ones of mouths forming the correct shape for the sound, so enabling the deaf child to correct his or her lips and make a more accurate sound. The lightpen could be used to manipulate the image to emphasise changes that should be made to the mouth shape.

Two second prizes of lightpens go to P Ross of Aylesbury and Alan Bickerstaffe of Hilltop School, Rotherham. Gladstone Electronics (which has taken over RH Electronics) and *Acorn User* are also supplying two packs of software to Kevin Simpson of Chester-le-Street, and Andrew Jackson of Chelmsford for their novel ideas – though I suspect Joan Collins has other ways of previewing bodylifts!

The *Talkback* competition in November's *Acorn User* proved difficult to judge as the entries were so varied.

Three runners-up prizes of Electrons and *Talkback* packages go to John Gough of Napton-on-the-Hill, John Hunter of Great Sutton and Miss Lilleberg of Bickley.

In the end the first prize of an Electron, Plus 1, Plus 3 and *Talkback* worth £800 was awarded to P L Pipe of Chilwell, Nottingham whose winning entry is listed here:

Characters: Maggie and Neil.

Incident: Without telling Denis or Glenys, Maggie and Neil have both employed the services of a computer dating scheme. A gremlin on a microchip has brought them together on a blind date.

Dialogue:

Neil: What's a nice girl like you doing in a place like this?

Maggie: Ooh, you flatterer. You Welsh tigers are all the same.

Neil: Enough of this idle banter.

How would you like to come up and see my manifesto?

Maggie: Not so fast, big boy. If you're naughty I won't develop your private sector.

Neil: All right, I'll behave. Let me take you away from all this.

Maggie: Why? I've got a super council house in the middle of the city.

Neil: Yes, but it's only terraced and Nigel next door must have lowered its value.

Maggie: You insolent young pup! I've a good mind to shove half a tub of Blue Band down the back of your trousers and see how you like that for a marginal seat!

ACORN USER
COMPETITION
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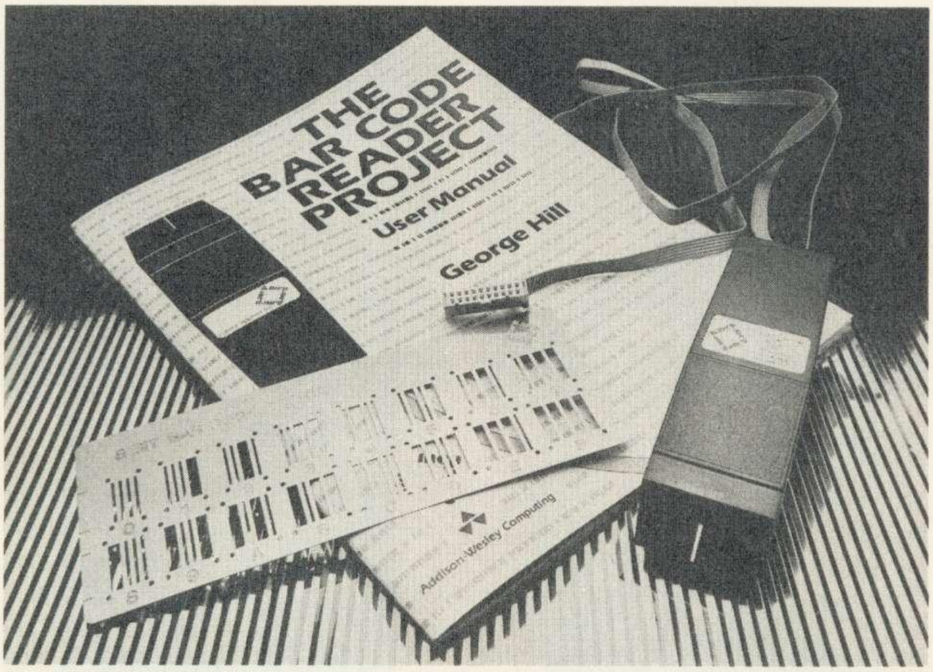
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All the major listings for this issue, as printed on the yellow pages, are reproduced in bar code format in our booklet. Send a cheque or postal order for £1.90 plus an A4-sized sae to Bar Code Listings at the address below.

The following back issues of bar code listings booklets are also available at £1.90 plus an sae: Dec 1984; Jan, Feb, May, June, July, Aug, Sept, Oct, Nov and Dec 1985; Jan and Feb 1986.

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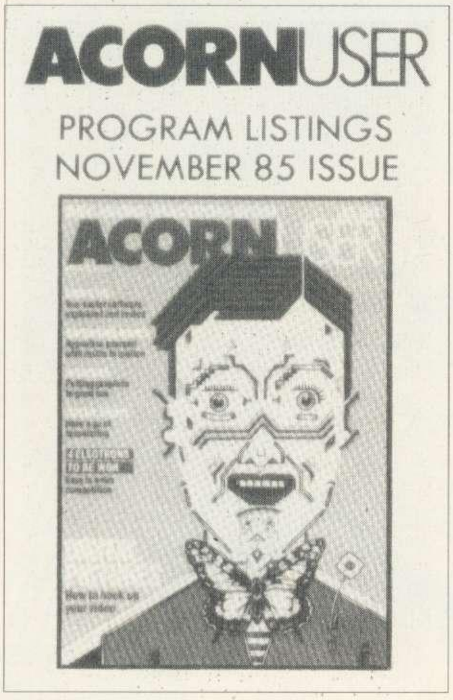
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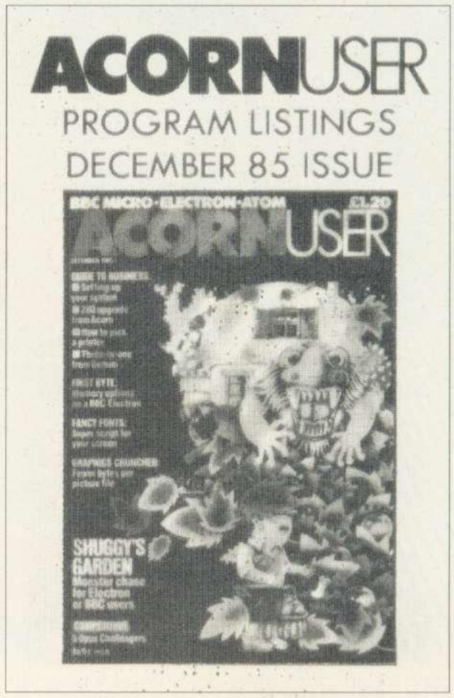
HA5

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Subscribe to the *Acorn User* monthly program listings on cassette, and we will send you both of our special cassettes, worth £3.95 each (see page 101 for details).

These are the entertaining and ever popular *Graphics* cassette and the indispensable selection of programs from the magazine contained in the *Best of Acorn User*.

Don't wait, subscribe now, while our offer lasts. Remember our cassettes are suitable for use with the Electron and the BBC micro.

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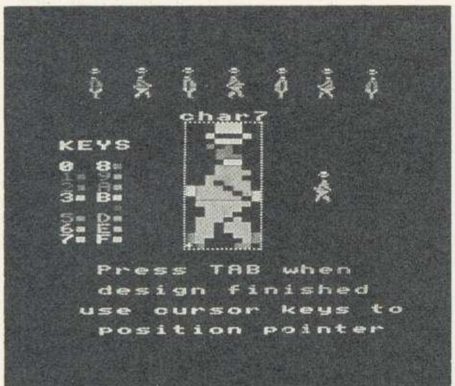
HA2

SPECIAL CASSETTES

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Special cassettes £3.95 each

ACORN USER GRAPHICS CASSETTE



The Graphics Cassette's sprite designer

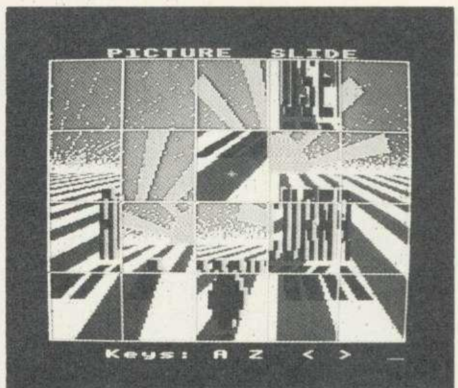
Four of the most popular and useful graphics programs that we've presented in *Acorn User* – Rob Fenton's *Paintbox,* Peter Sandford's *Colfill* and *Dotfill* and Harry Sinclair's Sprite designer – are now available on one cassette, suitable for use with the BBC micro or Electron, competitively priced at £3.95.

Paintbox, (February 1985), offers you a wide palette of facilities – airbrushing, drawing circles and squares, colour filling, colour mixing and textured effects – and it's fast!

Peter Sandford's *Dotfill* and *Colfill* (January and February 1985) allow you to produce bar charts, pie charts, maps, etc, with up to 28 coloured fill patterns and 24 tone patterns, and to mix foreground and background colours.

Harry Sinclair's Sprite designer from the September, October and November 1984 issues of *Acorn User* lets you design full-colour cartoon figures quickly, then edit, clone or mirror them and move them around the screen.

BEST OF ACORN USER CASSETTE



Picture Slide from the Best of Acorn User

The second cassette to be introduced in our developing range of special cassettes, *The Best of Acorn User*, contains a comprehensive selection of 11 program listings from past issues, which you will find entertaining and useful.

It features Malcolm Banthorpe's Turtle Graphics program, an easy introduction to Logo; an all screen mode printer dump for Epson and Epson-compatible printers; a bad program recovery routine for those times when it seems all is lost; a selection of sideways RAM utilities to help you make the most of your discs and ROMs, and two games to keep you amused, *Picture Slide* and *Quadline*.

Also included are a 40/80 track disc formatter, a tape to disc transfer routine, a disc menu and a painting program.

To order both or either cassette just complete the form and send it with your remittance to Acorn User Products, PHS Mailings Ltd, PO Box 14, Horley, Surrey RH6 8DW.

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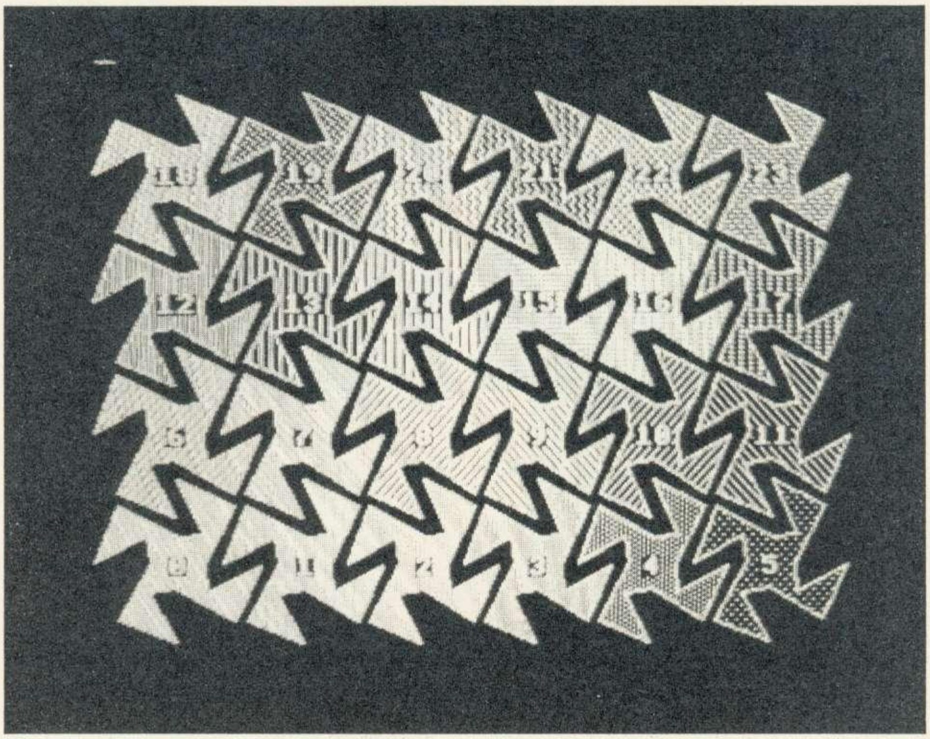
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USERROM

ACORN USER OFFER

Acorn User on a chip for £19.95



The *Acorn User UserROM* brings the best of *Acorn User* permanently into your micro. Put together by our technical editor, Bruce Smith, this 8k ROM chip is packed with your favourite routines that have appeared in the pages of *Acorn User* over the past two years. Simply plug the ROM chip into a spare sideways ROM socket and all the routines are instantly accessible via easy to use * commands – what could be simpler!

Routines include the popular colour fill and dot fill routines, bad program recovery, variable lister, function key lister, a graphics compiler, a circle drawing routine, a bulletin board, screen compressor, on screen character fonts, ROM lister, sound compiler, plus lots, lots more! Quite simply invaluable routines that the serious Acorn user cannot be without!

A 22-page manual is included, which explains in clear simple terms how to get the most from your *UserROM*, and includes many demonstration programs.

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LISTINGS

ACORN USER OFFER

March listings on cassette £3.75 or disc £5.75



This month's program listings cassette features a pixel editor to help you add details to your graphics, an amusing and educational music tutor, a program to save memory using sideways RAM and a utility to extend the HiBasic assembler in the 6502 second processor.

The disc version also includes the train and pencil sharpener screens (above) from the pixel editor article and the wimp fashions screen from the AMX Super Art review.

Monthly listings from back issues are available on cassette from May 1984 and on disc from October 1985.

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HA4

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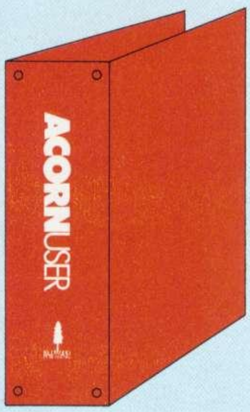
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ACORNUSER BACK ISSUES

BACK ISSUES

The following back issues are available:
1982 September, October, November and December
1983 January, July, September, October, November and December
1984 January, March, May, June, July, August, September, October, November and December
1985 January, March, April, May, June, July, August, September, October, November and December
1986 January and February
If you need further details about the contents of these issues send an sae to Back Issues, Diane Wiltshire, Acorn User, 68 Long Acre, London WC2E 9JH.

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YELLOW PAGES

HINTS & TIPS

PROGRAM		Page	BBC B	BBC B+/ 128K	Electron	Master 128	6502SP	Econet	ADFS	Monthly cassette & disc
Hints & Tips	Listing 1	105	●	●		●	●			●
	Listing 2	107	●	●		●		●	●	●(a)
Tunemaker	Listing 1	109	●	●	●	●	●	●	●	●
Sideways RAM										
Utilities	Listing 1	112	●	●				●	●	●(b)
	Listing 2	114	●	●				●	●	●(c)
	Listing 3	114	●	●			●	●	●	●(d)
	Listing 4	115	●	●			●	●	●	●(e)
Pixel Editor	Listing 1	116	●	●	●	●	●	●	●	●
HIBASIC										
Extensions	Listing 1	117	●	●			●	●	●	●(f)
	Listing 2	120	●	●			●	●	●	●(f)

Notes: (a) If you have a BBC B+, B+ 128 or Master 128 then turn off shadow RAM by typing *SHADOW 1 <Return>). (b) *Acorn User* UserRAM required. Also refer to article on page 85 if using Econet. (c) Solidisk sideways RAM required. Refer to note (b) if using Econet. (d) 6502 second processor required. See note (b) also. (e) 6502 second processor required. See note (c) also. (f) 6502 second processor with HiBasic required. Extra commands provided are standard on Master 128.

Entering listings

Where possible, programs are listed with line numbers in increments of 10 so type AUTO <RETURN> for automatic line numbering before you start. Don't type a space after each line number. To list your program so it appears identical to the printed version in the magazine type:

LISTO 1 <RETURN> WIDTH 40 <RETURN> LIST <RETURN>

With screen modes 1, 4, 6 or 7, WIDTH 40 is not needed. Occasionally, for clarity, programs are listed with a text width different to 40 characters.

Typing errors in Basic will usually cause error messages when the program is run. Finding errors in assembly language listings can be harder so we provide small, checking routines (called 'checksums') where possible.

All the Yellow Pages listings will work with Basic 1, 2 and 4 (unless stated otherwise) and with operating system OS 1.2 or later operating systems.

Hints & Tips, see page 49

How to enter Hints & Tips

The two listings from Hints & Tips this month each contain a small section of assembly language. To help you avoid making errors entering these sections, checksum routines have been included in the listings which will report any errors found.

Listing 1. Displays the contents of a single sector

```
   10 REM Hints & Tips - Listing 1
   20 REM Disc Sector Editor
   30 REM by Martin Phillips
   40 REM BBC B/B+/B+128/Master 128
   50 REM (c) Acorn User March 1986
   60 :
   70 IF PAGE<>&1900 PRINT"Reload at &19
 00":END
   80 MODE 0
   90 PROCinit
  100 PROCrun
  110 MODE 7
  120 END
  130 :
  140 DEF PROCinit
  150 *KEY10 OLD|M |N LIST|M
  160 DIM C$(1)
  170 wide=&1300:p=&1380:data=&1400
  180 S%=0:T%=0:D%=0:M%=0:@%=2
  190 H$="0123456789ABCDEF"
  200 B$="Disc Sector Editor"
  210 C$(0)=" Hex ":C$(1)="ASCII"
  220 *FX 4,1
  230 *KEY0 |!|L
  240 *KEY1 |!|M
  250 *KEY2 |!|N
  260 *KEY3 |!|O
  270 *KEY4 |!|p
  280 *KEY5 |!|Q
  290 *KEY6 |!|R
  300 *KEY9 |!|S
  310 VDU 19,0,6,0,0,0
  320 VDU 19,1,4,0,0,0
  330 VDU 23;8202;0;0;0;
```

Continued ▶

◀ Continued

```
  340 VDU 23,128,0,60,36,36,36,36,60,0
  350 VDU 23,129,0,60,60,60,60,60,60,0
  360 PROCmc
  370 ENDPROC
  380 :
  390 DEF PROCrun
  400 PROCscreen
  410 PROCtkno
  420 PROCrdsec
  430 PROCdisplay
  440 x%=0:y%=0:M%=0
  450 PROCrev
  460 REPEAT
  470 PROCinput
  480 UNTIL G%>140
  490 IF G%<147 THEN GOTO 420
  500 ENDPROC
  510 :
  520 DEF PROCscreen
  530 VDU 24,0;908;1279;1023;18,0,129,16
 ,26
  540 VDU 24,0;0;1279;128;18,0,129,16,26
  550 COLOUR 0:COLOUR 129
  560 PRINTTAB(4,29)"f0"TAB(8)"f1"TAB(16
 )"f2";
  570 PRINTTAB(25)"f3"TAB(34)"f4"TAB(43)
 "f5"TAB(52)"f6"TAB(67)"f9"
  580 PRINTTAB(2,30)" Hex "TAB(8)"Print"
 TAB(16)"Drive"TAB(25)"Sector";
  590 PRINTTAB(34)"Track"TAB(44)"Scan"TA
 B(52)"Write";TAB(68)"End"
  600 PROCdouble(B$,20,1)
  610 COLOUR 1:COLOUR 128
  620 MOVE 24,264:DRAW 24,872
  630 DRAW 1248,872:DRAW 1248,264
  640 DRAW 24,264
  650 MOVE 24,824:DRAW 1248,824
  660 MOVE 88,264:DRAW 88,872
  670 MOVE 928,264:DRAW 928,872
  680 FOR x%=0 TO 15
  690 PRINTTAB(3*x%+9,5);~x%
  700 PRINTTAB(60+x%,5);~x%:NEXT
  710 FOR y%=0 TO 15
```

Continued ▶

YELLOW PAGES
HINTS & TIPS

Hints & Tips Listing 1 continued

```
 720 PRINTTAB(3,7+y%);~y%:NEXT
 730 ENDPROC
 740 :
 750 DEF PROCdisplay
 760 FOR y%=0 TO 15
 770 FOR x%=0 TO 15
 780 PROCtype(2)
 790 NEXT:NEXT
 800 ENDPROC
 810 :
 820 DEF PROCrev
 830 PROCtype(2):COLOUR 129:COLOUR 0
 840 PROCtype(M%):COLOUR 128:COLOUR 1
 850 ENDPROC
 860 :
 870 DEF PROCtype(box)
 880 C%=?(data+x%+y%*16)
 890 IF box=1 THEN GOTO 920
 900 PRINTTAB(3*x%+8,7+y%)~C%;
 910 IF box=0 THEN ENDPROC
 920 PRINTTAB(60+x%,7+y%);
 930 IF C%<32 THEN VDU 128:ENDPROC
 940 IF C%>127 THEN VDU 129:ENDPROC
 950 VDU C%
 960 ENDPROC
 970 :
 980 DEF PROCinput
 990 G%=GET
1000 PROCtype(M%)
1010 IF x%>0 AND G%=136 THEN x%=x%-1
1020 IF x%<15 AND G%=137 THEN x%=x%+1
1030 IF y%>0 AND G%=139 THEN y%=y%-1
1040 IF y%<15 AND G%=138 THEN y%=y%+1
1050 IF G%=140 THEN M%=(M%+1) MOD 2:COL
OUR 0:COLOUR 129:PRINTTAB(2,30)C$(M%):CO
LOUR 1:COLOUR 128:GOTO 1160
1060 IF G%=141 THEN PROCprint:ENDPROC
1070 IF G%=142 THEN PROCdr:ENDPROC
1080 IF G%=143 THEN PROCsec:ENDPROC
1090 IF G%=144 THEN PROCtk:ENDPROC
1100 IF G%=145 THEN PROCscan:ENDPROC
1110 IF G%=146 THEN PROCwrsec:ENDPROC
1120 IF G%>126 THEN GOTO 1160
1130 I%=INSTR(H$,CHR$(G%))
1140 IF M%=0 AND I%=0 THEN GOTO 1160
1150 PROCupdate
1160 PROCrev
1170 ENDPROC
1180 :
1190 DEF PROCupdate
1200 IF M%=1 THEN C%=G%:GOTO1270
1210 C%=(C% AND 15)+(I%-1)*16
1220 ?(data+x%+y%*16)=C%
1230 PROCrev
1240 REPEAT:I%=INSTR(H$,CHR$(GET))
1250 UNTIL I%>0
1260 C%=(C% AND 240)+I%-1
1270 ?(data+x%+y%*16)=C%
1280 PROCtype(2)
1290 IF x%<15 THEN x%=x%+1 ELSE x%=0:y%
=(y%+1)MOD15
1300 ENDPROC
1310 :
1320 DEF PROCprint
1330 PROCshow("Printing sector")
1340 *FX 3,10
1350 VDU 1,14
1360 PRINTSPC(10)B$''STRING$(76,"-")
1370 PRINT"|   |";
```

Continued ▶

◀ Continued

```
1380 FOR x%=0 TO 15:PRINT" "~x%;:NEXT
1390 PRINT"  |  ";
1400 FOR x%=0 TO 15:PRINT;~x%;:NEXT
1410 PRINT" |"
1420 PRINTSTRING$(76,"-")
1430 FOR y%=0 TO 15
1440 PRINT"| ";~y%;" |";
1450 FOR x%=0 TO 15
1460 C%=?(data+x%+y%*16)
1470 PRINT" "~C%;:NEXT:PRINT"  |  ";
1480 FOR x%=0 TO 15
1490 C%=?(data+x%+y%*16)
1500 IF C%<32 OR C%>126 THEN C%=46
1510 PRINTCHR$(C%);:NEXT:PRINT" |"
1520 NEXT y%
1530 PRINTSTRING$(76,"-")
1540 PRINTTAB(10)"Drive:-"D% SPC(10)"Se
ctor:-"S% SPC(10)"Track:-"T%
1550 VDU 12
1560 *FX 3
1570 PRINTTAB(20,26)SPC(30)
1580 ENDPROC
1590 :
1600 DEF PROCdouble(A$,x,y)
1610 X%=0:Y%=&A:A%=10:do=&A00:d=&900
1620 C$=CHR$240+CHR$241+CHR$8+CHR$8
1630 C$=C$+CHR$10+CHR$242+CHR$243
1640 FOR N%=1 TO LEN(A$)
1650 ?do=ASC(MID$(A$,N%,1))
1660 CALL &FFF1:CALL wide
1670 VDU 23,240,d?1,d?1,d?3,d?3,d?5,d?5
,d?7,d?7
1680 VDU 23,241,d?2,d?2,d?4,d?4,d?6,d?6
,d?8,d?8
1690 VDU 23,242,d?9,d?9,d?11,d?11,d?13,
d?13,d?15,d?15
1700 VDU 23,243,d?10,d?10,d?12,d?12,d?1
4,d?14,d?16,d?16
1710 PRINTTAB(x+N%*2,y)C$
1720 NEXT N%
1730 ENDPROC
1740 :
1750 DEF PROCmc
1760 st=&900:chrdef=&A00
1770 tst=&70:bct=&71:tbct=&72
1780 FOR pass%=0 TO 2 STEP2
1790 P%=wide
1800 [OPT pass%
1810 LDX #1
1820 LDY #1
1830 .loclp
1840 LDA #0
1850 STA tbct
1860 LDA chrdef,Y
1870 STA tst
1880 .loopa
1890 INC tbct
1900 LDA #0
1910 STA bct
1920 .loopb
1930 LDA tst
1940 ROL A
1950 LDA st,X
1960 ROL A
1970 STA st,X
1980 LDA tst
1990 ROL A
2000 STA tst
2010 LDA st,X
```

Continued ▶

Listing 1 continued

```
2020 ROL A
2030 STA st,X
2040 INC bct
2050 LDA bct
2060 CMP #4
2070 BNE loopb
2080 INX
2090 LDA tbct
2100 CMP #2
2110 BNE loopa
2120 INY
2130 CPY #9
2140 BNE loclp
2150 RTS
2160 ]NEXT pass%
2170 :
2180 REM Checksum
2190 total%=0
2200 FOR byte%=wide TO P%-1
2210 total%=total%+?byte%
2220 NEXT byte%
2230 IF total%=6933 ENDPROC
2240 PRINT"Checksum error - please chec
k listing"
2250 END
2260 :
2270 DEF PROCrdsec
2280 p?0=D%:p!1=data:p?5=3
2290 p?6=&57:p?7=T%:p?8=S%:p?9=&21
2300 PRINTTAB(12,24)"Drive:-"D%
2310 PRINTTAB(32,24)"Sector:-"S%
2320 PRINTTAB(53,24)"Track:-"T%
2330 PROCosword
2340 del%=res% AND 32
2350 res%=res% AND 30
2360 IF res%=0 THEN ENDPROC
2370 PROCshow("Disc read error")
2380 key=GET:PRINTTAB(20,26)SPC(30)
2390 ENDPROC
2400 :
2410 DEF PROCosword
2420 A%=&7F:X%=p MOD 256
2430 Y%=p DIV 256
2440 CALL &FFF1:res%=p?10:ENDPROC
2450 :
2460 DEF PROCdr
2470 PROCshow("Which drive (0-3)?")
2480 REPEAT k=GET-48
2490 UNTIL k>-1 AND k<4
2500 D%=k:PRINTTAB(20,26)SPC(30)
2510 PROCtkno:ENDPROC
2520 :
2530 DEF PROCsec
2540 PROCshow("Which sector (0-9)?")
2550 REPEAT k=GET-48
2560 UNTIL k>-1 AND k<10
2570 S%=k:PRINTTAB(20,26)SPC(30)
2580 ENDPROC
2590 :
2600 DEF PROCtk
2610 PROCshow("Which track (0-"+STR$t%+
")?")
2620 INPUT""k
2630 T%=k:IF T%>t% THEN T%=0
2640 IF T%<0 THEN T%=0
2650 PRINTTAB(20,26)SPC(30):ENDPROC
2660 :
2670 DEF PROCtkno
2680 A%=&7E:X%=&70:Y%=0
```

Continued ►

◄ Continued

```
2690 CALL &FFF1
2700 t%=((?&71+?&72*256)DIV 10)-1
2710 ENDPROC
2720 :
2730 DEF PROCscan
2740 PROCshow("Press space bar to stop
scan")
2750 REPEAT
2760 S%=S%+1
2770 IF S%=10 THEN S%=0:T%=T%+1
2780 IF T%>t% THEN T%=0
2790 PROCrdsec
2800 PROCdisplay
2810 k=INKEY(200)
2820 UNTIL k>0
2830 PRINTTAB(20,26)SPC(35)
2840 ENDPROC
2850 :
2860 DEF PROCwrsec
2870 p?0=D%:p!1=data
2880 IF del%<>0 p?6=&4F ELSE p?6=&4B
2890 p?7=T%:p?8=S%:p?9=&21
2900 PROCosword
2910 res%=res% AND&1E
2920 IF res%=0 THEN ENDPROC
2930 PROCshow("Disc write error")
2940 key=GET:PRINTTAB(20,26)SPC(30)
2950 ENDPROC
2960 :
2970 DEF PROCshow(A$)
2980 COLOUR 0:COLOUR 129
2990 PRINTTAB(20,26)"  "A$"  ";
3000 COLOUR 1:COLOUR 128
3010 ENDPROC
```

Listing 2. Hurst and Herberth's program generates the card game 'Find the Lady'

```
10 REM Hints & Tips - Listing 2
20 REM Mode 7 Block Moving
30 REM by J Hurst & H Herberth
40 REM BBC B/B+/B+128/Master 128
50 REM (c) Acorn User March 1986
60 :
70 MODE 7
80 LOMEM=&3000
90 DIM card%(10)
100 REM set size of cards
110 rows%=10:cols%=10
120 VDU 23,1,0;0;0;0;
130 HIMEM=&6C00
140 REM assemble mover routine
150 PROCassemble
160 REM green Table
170 PROCtable
180 REM generate cards
190 PROCcards
200 REM save cards
210 PROCsave
220 REM set screen for game
230 PROCscreen
240 PROCgame
250 VDU 23,1,1;0;0;0;
260 END
270 :
```

Continued ►

Hints & Tips Listing 2 continued

```
  280 DEF PROCtable
  290 FOR I%=0 TO 24
  300 PRINTTAB(0,I%);CHR$146;CHR$157;
  310 NEXT
  320 ENDPROC
  330 :
  340 DEF PROCcards
  350 FOR I%=6 TO 15
  360 PRINTTAB(3,I%);CHR$151;CHR$157;TAB
(11,I%);CHR$146;CHR$157;
  370 PRINTTAB(15,I%);CHR$151;CHR$157;TA
B(23,I%);CHR$146;CHR$157;
  380 PRINTTAB(27,I%);CHR$145;CHR$157;TA
B(35,I%);CHR$146;CHR$157;
  390 PRINTTAB(5,7);CHR$129;"A";TAB(8,13
);"A";
  400 PRINTTAB(5,8);CHR$145;CHR$255;TAB(
8,14);CHR$145;CHR$255;
  410 PRINTTAB(6,10);CHR$145;CHR$255;CHR
$255;
  420 PRINTTAB(6,11);CHR$145;CHR$255;CHR
$255;
  430 PRINTTAB(0,0);
  440 NEXT
  450 :
  460 DEF PROCsave
  470 PROCmove(3,6,0)
  480 PROCmove(15,6,1)
  490 PROCmove(27,6,2)
  500 ENDPROC
  510 :
  520 DEF PROCmove(xtab%,ytab%,card%)
  530 oldloc%=&7C00+40*ytab%+xtab%
  540 ?oldlow%=oldloc% MOD 256
  550 ?oldhigh%=oldloc% DIV 256
  560 newloc%=&6C00+card%*(cols%*rows%)
  570 ?newlow%=newloc% MOD 256
  580 ?newhigh%=newloc% DIV 256
  590 CALL move
  600 ENDPROC
  610 :
  620 DEF PROCscreen
  630 your%=100:mine%=100
  640 PROCblank(3,6,0)
  650 PROCblank(15,6,1)
  660 PRINTTAB(12,1);CHR$141;CHR$129;"Fi
nd the ACE"
  670 PRINTTAB(12,2);CHR$141;CHR$129;"Fi
nd the ACE"
  680 PRINTTAB(5,3);CHR$141;CHR$129;"1"
  690 PRINTTAB(5,4);CHR$141;CHR$129;"1"
  700 PRINTTAB(17,3);CHR$141;CHR$129;"2"
  710 PRINTTAB(17,4);CHR$141;CHR$129;"2"
  720 PRINTTAB(29,3);CHR$141;CHR$129;"3"
  730 PRINTTAB(29,4);CHR$141;CHR$129;"3"
  740 PRINTTAB(2,18);CHR$129"You have ";
your%;TAB(24,18);"I have ";mine%;
  750 ENDPROC
  760 :
  770 DEF PROCblank(xtab%,ytab%,card%)
  780 oldloc%=&6C00+2*cols%*rows%
  790 ?oldlow%=oldloc% MOD 256
  800 ?oldhigh%=oldloc% DIV 256
  810 newloc%=&7C00+40*ytab%+xtab%
  820 ?newlow%=newloc% MOD 256
  830 ?newhigh%=newloc% DIV 256
  840 CALL moveback
  850 ENDPROC
  860 :
```

Continued ▶

◀ Continued

```
  870 DEF PROCgame
  880 m6$=STRING$(31," ")
  890 m1$=CHR$129+"Place your bet  "
  900 m2$=CHR$129+"Sorry you have not en
ough points"
  910 m3$=CHR$129+"Tap the spacebar to c
ontinue"+STRING$(5," ")
  920 m4$=CHR$129+"Select a card 1 - 3 "
  930 REPEAT
  940 PRINTTAB(5,20)m6$;TAB(5,20);m1$;
  950 INPUT bet%
  960 IF bet%<=your% THEN PROCplay ELSE
PROCerror
  970 UNTIL your%<=0 OR mine%<=0
  980 IF mine%<=0 THEN m$="You win" ELSE
 m$="I win"
  990 CLS:PRINTTAB(5,5);CHR$141;"Game ov
er ";m$
 1000 PRINTTAB(5,6);CHR$141;"Game over "
;m$
 1010 ENDPROC
 1020 :
 1030 DEF PROCplay
 1040 card%(1)=RND(3)
 1050 REPEAT
 1060 card%(2)=RND(3)
 1070 UNTIL card%(1)<>card%(2)
 1080 card%(3)=6-card%(1)-card%(2)
 1090 PRINTTAB(5,20);m4$;
 1100 REPEAT:sel%=GET
 1110 UNTIL sel%>48 AND sel%<52
 1120 sel%=sel%-48:PRINT"";sel%
 1130 IF card%(sel%)=1 THEN oldloc%=&6C0
0:m5$="Well done":your%=your%+bet%:mine%
=mine%-bet% ELSE oldloc%=&6C00+rows%*col
s%:m5$="Bad luck":your%=your%-bet%:mine%
=mine%+bet%
 1140 ?oldlow%=oldloc% MOD 256
 1150 ?oldhigh%=oldloc% DIV 256
 1160 newloc%=&7C00+6*40+3+(sel%-1)*12
 1170 ?newlow%=newloc% MOD 256
 1180 ?newhigh%=newloc% DIV 256
 1190 CALL moveback
 1200 PRINTTAB(5,22);CHR$136;CHR$129;CHR
$7;m5$;CHR$137;
 1210 TIME=0:REPEAT:UNTIL TIME>300
 1220 PRINTTAB(5,22);"              ";
 1230 oldloc%=&6C00+2*rows%*cols%
 1240 ?newlow%=newloc% MOD 256
 1250 ?newhigh%=newloc% DIV 256
 1260 ?oldlow%=oldloc% MOD 256
 1270 ?oldhigh%=oldloc% DIV 256
 1280 CALL moveback
 1290 PRINTTAB(12,18);your%;"    ";TAB(31
,18);mine%;"     "
 1300 ENDPROC
 1310 :
 1320 DEF PROCerror
 1330 PRINTTAB(5,20);m2$
 1340 TIME=0:REPEAT:UNTIL TIME>300
 1350 PRINTTAB(5,20);m3$
 1360 REPEAT:key=GET:UNTIL key=32
 1370 PRINTTAB(5,20);m6$
 1380 ENDPROC
 1390 :
 1400 DEF PROCassemble
 1410 oldlow%=&70:oldhigh%=&71
 1420 newlow%=&72:newhigh%=&73
 1430 DIM code% 200
 1440 FOR pass%=0 TO 2 STEP 2
```

Continued ▶

Listen to the music, see page 78

Hints & Tips Listing 2 continued

```
1450 P%=code%
1460 [OPT pass%
1470 .move
1480 LDX #rows%
1490 .row
1500 LDY #0
1510 .col
1520 LDA (oldlow%),Y
1530 STA (newlow%),Y
1540 INY
1550 CPY #cols%
1560 BNE col
1570 DEX
1580 CPX #0
1590 BEQ endmove
1600 LDA oldlow%
1610 CLC
1620 ADC #40
1630 STA oldlow%
1640 LDA oldhigh%
1650 ADC #0
1660 STA oldhigh%
1670 LDA newlow%
1680 CLC
1690 ADC #cols%
1700 STA newlow%
1710 LDA newhigh%
1720 ADC #0
1730 STA newhigh%
1740 JMP row
1750 .endmove
1760 RTS
1770 .moveback
1780 LDX  #rows%
1790 .loop1
1800 LDY #0
1810 .loop2
1820 LDA (oldlow%),Y
1830 STA (newlow%),Y
1840 INY
1850 CPY #cols%
1860 BNE loop2
1870 DEX
1880 CPX #0
1890 BEQ end
1900 LDA oldlow%
1910 CLC
1920 ADC #cols%
1930 STA oldlow%
1940 LDA oldhigh%
1950 ADC #0
1960 STA oldhigh%
1970 LDA newlow%
1980 CLC
1990 ADC #40
2000 STA newlow%
2010 LDA newhigh%
2020 ADC #0
2030 STA newhigh%
2040 JMP loop1
2050 .end
2060 RTS
2070 ]NEXT
2080 :
2090 REM Checksum
2100 total%=0
2110 FOR byte%=code% TO P%-1
2120 total%=total%+?byte%
2130 NEXT byte%
2140 IF total%=10902 ENDPROC
2150 PRINT"Checksum error - please chec
k listing":END
```

Listing 1. Notes are copied from the score onto the screen without naming.
NB: this listing is dumped with WIDTH = 41 (see Entering listings, page 105)

```
10 REM Tunemaker
20 REM by Colin Atkins
30 REM BBC B/B+/Master/Electron
40 REM (c) Acorn User March 1986
50 *KEY 10 OLD|M |N LIST |M
60 ON ERROR PROCerror
70 MODE 4
80 VDU 23;8202;0;0;0;
90 ENVELOPE 1,7,2,-1,1,1,1,1,126,0,0,-
126,126,126
100 PROCchars
110 PROCscale
120 PROCintro
130 VDU 19,0,6;0;19,1,0;0;
140 *FX 4,1
150 *FX 11,0
160 *OPT 1,1
170 *OPT 2,1
180 notune%=TRUE
190 PROCmenu
200 END
210 DEF PROCerror
220 IF ERR=17 THEN PROCmenu ELSE CLS:RE
PORT:PRINT " at line ";ERL:END
230 ENDPROC
240 :
250 DEF PROCchars
260 REM notes (bottom)
270 VDU 23,226,0,0,60,102,195,195,102,6
0
280 VDU 23,227,12,12,12,124,204,204,120
,0
290 VDU 23,228,12,12,12,124,252,252,120
,0
300 VDU 23,232,14,15,13,124,252,252,120
,0
310 REM notes (top)
320 VDU 23,229,0,0,12,12,12,12,12,12
330 VDU 23,230,0,0,14,15,13,12,12,12
340 VDU 23,231,0,0,14,15,13,14,15,13
350 REM cursors
360 VDU 23,233,24,60,126,255,219,24,24,
24
370 VDU 23,248,24,56,112,255,255,112,56
,24
380 REM flat
390 VDU 23,234,32,32,32,44,50,34,44,48
400 REM rests
410 VDU 23,235,67,231,254,70,12,24,48,4
8
420 VDU 23,249,0,0,0,0,0,126,126,255
430 REM tie
440 VDU 23,236,1,2,4,24,224,0,0,0
450 VDU 23,237,128,64,32,24,7,0,0,0
460 REM treble clef
470 VDU 23,238,1,3,2,2,3,3,6,14
480 VDU 23,239,128,192,64,192,128,0,0,0
490 VDU 23,240,26,26,49,97,99,199,201,2
18
500 VDU 23,241,0,0,0,0,192,240,24,24
510 VDU 23,242,204,68,96,56,15,0,6,7
520 VDU 23,243,152,152,176,224,128,128,
128,128
530 REM bass clef
540 VDU 23,244,127,128,128,220,124,8,0,
0
550 VDU 23,245,192,99,35,16,16,16,19,19
560 VDU 23,246,0,0,0,0,0,0,1,2
```

Continued ►

Atkins listing 1 continued

```
  570 VDU 23,247,16,16,32,32,64,128,0,0
  580 ENDPROC
  590 :
  600 DEF PROCmenu
  610 REPEAT:COLOUR 128:COLOUR 1
  620 VDU 4:CLS:PRINTTAB(13,5)"Tunemaker
Menu"
  630 PRINTTAB(8,8)"1) Make a tune";TAB(8
,10)"2) Play tune"
  640 PRINTTAB(8,12)"3) SAVE tune";TAB(8,
14)"4) LOAD tune"
  650 PRINTTAB(8,16)"5) List SOUND data";
TAB(8,18)"6) Exit program"
  660 PRINTTAB(8,20)"'Escape' - menu page
"
  670 INPUTTAB(8,24)"Option",opt%
  680 IF opt%>6 OR opt%<1 THEN GOTO 750
  690 IF opt%=1 THEN CLEAR:PROCmaketune
  700 IF opt%=4 THEN CLEAR:PROCload
  710 IF notune% THEN PRINTTAB(2,30)"NO T
UNE IN MEMORY":GOTO 750
  720 IF opt%=2 THEN INPUTTAB(2,26)"Set t
empo(RETURN for tempo=120)",tempo%:PRINTT
AB(0,22)SPC(39):PROCplay
  730 IF opt%=3 THEN PROCsave
  740 IF opt%=5 THEN PROCdata
  750 UNTIL opt%=6:PROCend
  760 ENDPROC
  770 :
  780 DEF PROCmaketune
  790 DIM maska% 3,maskb% 3
  800 LOCAL note%
  810 PROCinitial
  820 PROCscale
  830 PROCscreen
  840 REPEAT
  850 triplet%=FALSE:sharp%=FALSE
  860 flat%=FALSE:dot%=FALSE
  870 tie%=FALSE:return%=FALSE
  880 vol%=1:gap%=1
  890 REPEAT:PROCselectnote
  900 UNTIL return%=TRUE
  910 PROCprintnote
  920 PROCstorenote
  930 UNTIL FALSE
  940 ENDPROC
  950 :
  960 DEF PROCstave
  970 VDU 24,0;500;1220;810;
  980 GCOL 0,128:GCOL 0,1:CLG
  990 ystave%=500:MOVE 0,ystave%
 1000 FOR line%=1 TO 14
 1010 IF line%=6 OR line%>11 MOVE 1200,ys
tave%
 1020 DRAW 1220,ystave%
 1030 ystave%=ystave%+20:MOVE 0,ystave%
 1040 NEXT line%
 1050 VDU 26
 1060 REM draw clefs
 1070 VDU 5:MOVE 0,700
 1080 PRINTCHR$(238)+CHR$(239)
 1090 MOVE 0,668:PRINTCHR$(240)+CHR$(241)
 1100 MOVE 0,636:PRINTCHR$(242)+CHR$(243)
 1110 MOVE 0,576:PRINTCHR$(244)+CHR$(245)
 1120 MOVE 0,544:PRINTCHR$(246)+CHR$(247)
 1130 ENDPROC
 1140 :
 1150 DEF PROCselectnote
 1160 oh%=H%:oy%=Y%:VDU4
 1170 IF tempo%=0 THEN tempo%=120
```

Continued ▶

◀ Continued

```
 1180 PRINTTAB(22,5)"Tempo : ";CHR$(228);
"=";tempo%;SPC(4)
 1190 PRINTTAB(30,4)CHR$(229)
 1200 PRINTTAB(H%,22)CHR$(233)
 1210 PROCycurs(Y%+4)
 1220 key$=GET$
 1230 IF key$="C" OR key$="c" THEN PRINTT
AB(32,5);SPC(5):INPUTTAB(32,5),tempo%;SPC
(5)
 1240 IF note%=0 THEN GOTO 1280
 1250 IF ASC(key$)=127 THEN PROCdelete
 1260 IF key$="P" OR key$="p" THEN PROCpl
ay
 1270 IF key$="T" OR key$="t" THEN tie%=T
RUE:PROCtie
 1280 IF ASC(key$)=138 THEN Y%=Y%-10:IF Y
%<533 THEN Y%=533
 1290 IF ASC(key$)=139 THEN Y%=Y%+10:IF Y
%>773 THEN Y%=773
 1300 IF ASC(key$)=136 OR ASC(key$)=137 T
HEN PRINTTAB(H%-1,20)" ";TAB(H%+1,20)" ";
TAB(H%,21)" "
 1310 IF ASC(key$)=137 THEN H%=H%+5:IF H%
>37 THEN H%=37
 1320 IF ASC(key$)=136 THEN H%=H%-5:IF H%
<2 THEN H%=2
 1330 IF key$="S" OR key$="s" THEN sharp%
=TRUE:PRINTTAB(H%-1,20)"#"
 1340 IF key$="." OR key$=">" THEN dot%=T
RUE:PRINTTAB(H%+1,20)"."
 1350 IF key$="F" OR key$="f" THEN flat%=
TRUE:PRINTTAB(H%-1,20)CHR$(234)
 1360 IF key$="3" THEN triplet%=TRUE:PRIN
TTAB(H%,21)"3"
 1370 PRINTTAB(oh%,22)" "
 1380 PROCycurs(oy%+4)
 1390 IF ASC(key$)=13 THEN return%=TRUE:n
otune%=FALSE
 1400 ENDPROC
 1410 :
 1420 DEF PROCprintnote
 1430 PRINTTAB(H%-1,20)" ";TAB(H%+1,20)"
";TAB(H%,21)" "
 1440 VDU5
 1450 IF X%>1150 PROCdump:X%=100:PROCstav
e
 1460 IF H%=2 nb%=249:nt%=0:dur%=23
 1470 IF H%=7 nb%=235:nt%=0:dur%=5
 1480 IF H%=12 nb%=226:nt%=0:dur%=47
 1490 IF H%=17 nb%=227:nt%=229:dur%=23
 1500 IF H%=22 nb%=228:nt%=229:dur%=11
 1510 IF H%=27 nb%=228:nt%=230:dur%=5
 1520 IF H%=32 nb%=228:nt%=231:dur%=2
 1530 IF H%=37 nb%=232:nt%=231:dur%=1
 1540 GCOL 1,1
 1550 IF H%=7 MOVE X%,673:PRINT CHR$(nb%)
:MOVE X%,553:PRINT CHR$(nb%)
 1560 IF H%=2 MOVE X%,690:PRINT CHR$(nb%)
:MOVE X%,570:PRINT CHR$(nb%)
 1570 IF H%=7 OR H%=2 THEN vol%=0:ENDPROC
 1580 MOVE X%,Y%+7:PRINTCHR$(nb%)
 1590 MOVE X%,Y%+39:PRINTCHR$(nt%)
 1600 IF Y%=613 MOVE X%-10,Y%-13:DRAW X%+
30,Y%-13
 1610 IF Y%>723 THEN PROCleger
 1620 IF triplet% THEN dur%=dur%*2/3:MOVE
X%,Y%-25:PRINT"3"
 1630 IF dot% THEN dur%=(dur%*1.5)+1:MOVE
X%+25,Y%+12:PRINT"."
```

Continued ▶

Atkins listing 1 continued

```
 1640 pitch%=scale%((Y%-533)/10)
 1650 IF sharp% THEN pitch%=pitch%+4:MOVE
X%-35,Y%+2:PRINT"#"
 1660 IF flat% THEN pitch%=pitch%-4:MOVE
X%-35,Y%+12:PRINT CHR$(234)
 1670 IF tie% THEN gap%=0:dur%=dur%+1
 1680 ENDPROC
 1690 :
 1700 DEF PROCstorenote
 1710 P%(note%)=pitch%:D%(note%)=dur%
 1720 G%(note%)=gap%:V%(note%)=vol%
 1730 note%=note%+1
 1740 IF note%>299 THEN note%=299
 1750 SOUND 1,vol%,pitch%,dur%
 1760 X%=X%+100
 1770 ENDPROC
 1780 :
 1790 DEF PROCscreen
 1800 CLS
 1810 PRINTTAB(2,20)CHR$(249);TAB(7,20)CH
R$(235);TAB(12,20)CHR$(226);TAB(17,20)CHR
$(227);TAB(22,20)CHR$(228)
 1820 PRINTTAB(17,19)CHR$(229);TAB(22,19)
CHR$(229)
 1830 PRINTTAB(27,20)CHR$(228);TAB(32,20)
CHR$(228);TAB(37,20)CHR$(232)
 1840 PRINTTAB(27,19)CHR$(230);TAB(32,19)
CHR$(231);TAB(37,19)CHR$(231)
 1850 PRINTTAB(2,1)"Cursor keys..select n
ote type & pitch"
 1860 PRINTTAB(2,5)"'C'..change tempo"
 1870 PRINTTAB(2,3)"'Return'..print note
'3'..triplet"
 1880 PRINTTAB(2,25)"'S'..sharp";SPC(5);"
'P'..play tune";TAB(2,27)"'F'..flat"SPC(6
);"'.'..dotted note"
 1890 PRINTTAB(2,29)"'T'..tie notes 'Dele
te'..delete note"
 1900 PROCstave
 1910 ENDPROC
 1920 :
 1930 DEF PROCleger
 1940 leg%=733
 1950 REPEAT
 1960 MOVE X%-10,leg%-13
 1970 DRAW X%+30,leg%-13
 1980 leg%=leg%+20
 1990 UNTIL leg%>Y%
 2000 ENDPROC
 2010 :
 2020 DEF PROCplay
 2030 IF tempo%=0 THEN tempo%=120
 2040 LOCAL note%
 2050 note%=-1:REPEAT:note%=note%+1
 2060 IF G%(note%)=0 THEN GOTO 2080
 2070 SOUND 1,0,0,1
 2080 SOUND 1,V%(note%),P%(note%),D%(note
%)*100/tempo%
 2090 UNTIL D%(note%)=0
 2100 ENDPROC
 2110 :
 2120 DEF PROCsave
 2130 REPEAT
 2140 CLS:PRINTTAB(2,3)"SAVE tune"
 2150 INPUTTAB(2,5)"Enter filename(max. 7
letters)",f$
 2160 UNTIL LEN(f$)<8 AND LEN(f$)>0
 2170 out=OPENOUT(f$)
 2180 LOCAL note%
```

Continued ►

◄ Continued

```
 2190 note%=-1:REPEAT:note%=note%+1
 2200 PRINT#out,V%(note%)
 2210 PRINT#out,P%(note%)
 2220 PRINT#out,D%(note%)
 2230 PRINT#out,G%(note%)
 2240 UNTIL D%(note%)=0
 2250 CLOSE#out:*FX 125
 2260 ENDPROC
 2270 :
 2280 DEF PROCload
 2290 PROCinitial
 2300 REPEAT
 2310 CLS:PRINTTAB(2,3)"LOAD tune"
 2320 INPUTTAB(2,5)"Enter filename(max. 7
letters)",f$
 2330 UNTIL LEN(f$)<8 AND LEN(f$)>0
 2340 out=OPENIN(f$)
 2350 LOCAL note%
 2360 note%=-1:REPEAT:note%=note%+1
 2370 INPUT#out,V%(note%)
 2380 INPUT#out,P%(note%)
 2390 INPUT#out,D%(note%)
 2400 INPUT#out,G%(note%)
 2410 UNTIL EOF#out
 2420 CLOSE#out
 2430 notune%=FALSE:*FX 125
 2440 ENDPROC
 2450 :
 2460 DEF PROCdelete
 2470 GCOL 0,1
 2480 note%=note%-1
 2490 IF note%<0 THEN note%=0
 2500 X%=X%-100:IF X%<100 THEN X%=100
 2510 V%(note%)=0:D%(note%)=0
 2520 VDU 24,X%-50;500;X%+40;810;:CLG
 2530 ys%=500:MOVE X%-50,ys%
 2540 FOR line%=1 TO 14
 2550 IF line%=6 OR line%>11 GOTO 2570
 2560 DRAW X%+40,ys%
 2570 ys%=ys%+20:MOVE X%-50,ys%
 2580 NEXT:VDU 26:GCOL 3,1
 2590 ENDPROC
 2600 :
 2610 DEF PROCintro
 2620 VDU 19,0,1;0;19,1,0;0;
 2630 GCOL 0,128:GCOL 0,1:CLG:VDU 5
 2640 PROCstave
 2650 LOCAL X%,Y%,N%,note%
 2660 FOR note%=0 TO 49:p%=note%
 2670 X%=100+RND(1000):Y%=400+RND(400)
 2680 N%=228+RND(3)
 2690 MOVE X%,Y%:PRINTCHR$(228)
 2700 MOVE X%,Y%+30:PRINTCHR$(N%)
 2710 IF note%>24 THEN p%=49-note%
 2720 SOUND 1,1,scale%(p%),1
 2730 NEXT note%
 2740 TIME=0:REPEAT UNTIL TIME>200
 2750 ENDPROC
 2760 :
 2770 DEF PROCdata
 2780 CLS:VDU 14
 2790 PRINTTAB(2,3)"(D-values correspond
to tempo=120)"
 2800 PRINTTAB(5,5)"Note no.","Pitch","Du
ration","Gap"
 2810 LOCAL note%:note%=-1
 2820 REPEAT:note%=note%+1
 2830 IF D%(note%)=0 GOTO 2880
 2840 pitch$=STR$(P%(note%))
```

Continued ►

Atkins listing 1 continued

```
2850 IF V%(note%)=0 pitch$="REST"
2860 PRINT(note%+1),SPC(5);pitch$,D%(not
e%)
2870 PRINTSPC(36);G%(note%+1)
2880 UNTIL D%(note%)=0
2890 REPEAT UNTIL FALSE
2900 ENDPROC
2910 :
2920 DEF PROCinitial
2930 DIM P%(300),D%(300),V%(300),G%(300)
2940 note%=0:pitch%=0:dur%=0:gap%=1
2950 H%=22:X%=100:Y%=613
2960 tempo%=120:notune%=TRUE
2970 ENDPROC
2980 :
2990 DEF PROCtie
3000 VDU 5:GCOL 1,1
3010 MOVE X%-70,Y%-20
3020 PRINTCHR$(237)+CHR$(236)
3030 ENDPROC
3040 :
3050 DEF PROCycurs(ypos%)
3060 VDU 5:GCOL 3,1
3070 MOVE 1230,ypos%:PRINTCHR$(248)
3080 VDU 4
3090 ENDPROC
3100 :
3110 DEF PROCend
3120 VDU 22,6:*FX 21,0
3130 *FX 4,0
3140 *FX 12,0
3150 *OPT
3160 CLS:END
3170 ENDPROC
3180 :
3190 DEF PROCscale
3200 LOCAL note%:DIM scale%(25)
3210 FOR note%=0 TO 24
3220 READ pvalue%
3230 scale%(note%)=pvalue%
3240 NEXT note%
3250 DATA 0,4,12,20,24,32,40
3260 DATA 48,52,60,68,72,80,88
3270 DATA 96,100,108,116,120,128,136
3280 DATA 144,148,156,164
3290 ENDPROC
3300 DEF PROCdump:VDU 4
3310 PRINTTAB(10,22)"Printer dump? (Y/N)
"
3320 REPEAT
3330 dump%=INSTR(" YyNn",GET$)DIV2
3340 UNTIL dump%
3350 IF dump%=2 PRINTTAB(10,22)SPC19:VDU
5:ENDPROC
3360 PRINTTAB(10,22)SPC6"Dumping"SPC6
3370 REM This dump for Epson-style
3380 REM printers - replace lines 3420
3390 REM to 3590 with your own dump
3400 REM routine if necessary.
3410 :
3420 LOCAL X%,Y%,A%,B%,C%
3430 !maska%=&3010000:!maskb%=&3020100
3440 MOVE 0,0
3450 VDU 29,0;0;2,1,27,1,65,1,8,1,10
3460 FOR Y%=768 TO 512 STEP-16
3470 VDU 1,27,1,76,1,192,1,3
3480 FOR X%=0 TO 1276 STEP 4
3490 A%=0:B%=0
```

Continued ►

◄ Continued

```
3500 FOR Z%=0 TO 12 STEP 4
3510 C%=POINT(X%,Y%-Z%)
3520 A%=A%*4+maska%?C%
3530 B%=B%*4+maskb%?C%
3540 NEXT
3550 VDU 1,A%,1,B%,1,A%
3560 NEXT
3570 VDU 1,10
3580 NEXT
3590 VDU 1,27,1,64,3
3600 :
3610 PRINTTAB(10,22)SPC19
3620 ENDPROC
```

Sideways Storage, see page 85

How to enter Sideways RAM utilities

To help you spot any typing errors you may make when entering the assembly language sections of listings 1 to 4, two checksum routines (listing 5 to 6) are provided. To check listing 1, add to it the extra lines in listing 5 and run the program. If an error is reported, check your listing carefully. To check listing 2, add the lines in listing 5 and alter the figure in line 915 from 15144 to 16339. To check listing 3 add the lines of listing 6 and run the program. Again, any errors found will be reported. Finally, to check listing 4, add the lines in listing 6 and change the figure in line 1555 from 23918 to 26416.

Please note that the listings presented here were written for the Acorn User UserRAM and Solidisk sideways RAM bank. The listings cannot therefore be guaranteed to work on other makes of sideways RAM as several of these do not allow the user to write data directly into the sideways RAM bank.

Listing 1. Accesses registers and sideways memory directly

```
 10 REM Read/Write UserRAM Vers. 1
 20 REM by Mike Rawlings
 30 REM BBC B/B+ with UserRAM
 40 REM (c) Acorn User March 1986
 50 :
 60 A=0:REM first variable declared
 70 float=LOMEM+3:REM addr. of "A"
 80 bk=15:REM bank 15
 90 b=&8010:REM byte addr.
100 t=&9000:REM integer addr.
110 f=&A000:REM floating point addr.
120 s=&B000:REM string addr.
130 len=31:REM max. len. of string +1
140 :
150 DIM code 120,string 256
160 FOR pass=0 TO 2 STEP 2
170 P%=code
180 [OPT pass
190 .read
200 JSR sub1
210 PHA
220 .loop1
230 LDA (&90),Y
240 STA &94,Y
250 INY
260 CPY &93
270 BNE loop1
280 JMP exit
```

Continued ►

Rawling's listing 1 continued

```
290 .write
300 JSR sub1
310 PHA
320 .loop2
330 LDA &94,Y
340 STA (&90),Y
350 INY
360 CPY &93
370 BNE loop2
380 JMP exit
390 .wfloat
400 LDY #0
410 .loop3
420 LDA float,Y
430 STA &94,Y
440 INY
450 CPY #5
460 BNE loop3
470 STY &93
480 JMP write
490 .rfloat
500 LDA #5
510 STA &93
520 JSR read
530 LDY #0
540 .loop4
550 LDA &94,Y
560 STA float,Y
570 INY
580 CPY #5
590 BNE loop4
600 RTS
610 .wstring
620 JSR sub1
630 PHA
640 .loop5
650 LDA string,Y
660 STA (&90),Y
670 INY
680 CMP #13
690 BNE loop5
700 JMP exit
710 .rstring
720 JSR sub1
730 PHA
740 .loop6
750 LDA (&90),Y
760 STA string,Y
770 INY
780 CMP #13
790 BNE loop6
800 .exit
810 PLA
820 STA &FE30
830 RTS
840 .sub1
850 CLC
860 LDA &F4
870 LDY &92
880 STY &FE30
890 LDY #0
900 RTS
910 ]NEXT
920 :
930 REM byte read/write demo
940 PROCb(10,158)
950 PRINTFNb(10)
960 :
970 REM integer read/write demo
```

Continued ▶

◀ Continued

```
980 PROCt(10,1580)
990 PRINTFNt(10)
1000 :
1010 REM floating p'nt read/write demo
1020 PROCf(10,158.23)
1030 PRINTFNf(10)
1040 :
1050 REM string read/write demo
1060 PROCs(5,"READ/WRITE")
1070 PRINTFNs(5)
1080 END
1090 :
1100 REM write byte
1110 DEF PROCb(n,v)
1120 !&90=b+n:?&92=bk:?&93=1:?&94=v
1130 CALL write
1140 ENDPROC
1150 :
1160 REM read byte
1170 DEF FNb(n)
1180 !&90=b+n:?&92=bk:?&93=1
1190 CALL read
1200 =?&94
1210 :
1220 REM write integer
1230 DEF PROCt(n,v)
1240 !&90=t+n*4:?&92=bk:?&93=4:!&94=v
1250 CALL write
1260 ENDPROC
1270 :
1280 REM read integer
1290 DEF FNt(n)
1300 !&90=t+n*4:?&92=bk:?&93=4
1310 CALL read
1320 =!&94
1330 :
1340 REM write floating point
1350 DEF PROCf(n,A)
1360 !&90=f+n*5:?&92=bk
1370 CALL wfloat
1380 ENDPROC
1390 :
1400 REM read floating point
1410 DEF FNf(n)
1420 !&90=f+n*5:?&92=bk
1430 CALL rfloat
1440 =A
1450 :
1460 REM write string
1470 DEF PROCs(n,$string)
1480 !&90=s+n*len:?&92=bk
1490 CALL wstring
1500 ENDPROC
1510 :
1520 REM read string
1530 DEF FNs(n)
1540 !&90=s+n*len:?&92=bk
1550 CALL rstring
1560 =$string
```

All the major listings for this issue, as printed on the yellow pages, are reproduced in bar code format in our booklet. Turn to page 99 for details of how to obtain your copy.
The Bar Code Teaching Pack, produced by the Micro-electronics Education Programme (MEP) and Addison-Wesley, is available direct to readers of AU. The pack includes: bar code reader, explanatory booklet; software to print bar codes; music program by Joe Telford; bar code stencil and disc or cassette of utility software.

Listing 2. The Tube-compatible version of listing 1

```
 10 REM Read/Write Solidisk Vers. 1
150 DIM code 128,string 256
300 JSR sub2
310 :
380 RTS
620 JSR sub2
630 :
700 RTS
901 :
902 .sub2
903 CLC
904 LDA #15
905 STA &FE62
906 LDA &92
907 STA &FE60
908 LDY #0
909 RTS
```

Listing 3. This program works on the same principle as listing 1 but is Tube-compatible and uses OSWORD and OSBYTE

```
 10 REM Read/Write UserRAM Vers. 2
 20 REM by Mike Rawlings
 30 REM BBC B/B+ with 6502SP
 40 REM (c) Acorn User March 1986
 50 :
 60 A=0:REM 1st variable declared
 70 float=LOMEM+3:REM addr. of "A"
 80 bk=15:REM bank 15
 90 b=&8010:REM byte addr.
100 t=&9000:REM integer addr.
110 f=&A000:REM floating point addr.
120 s=&B000:REM string address
130 len=31:REM max. len. of string +1
140 :
150 DIM string 256
160 FOR pass=0 TO 2 STEP 2
170 P%=&260
180 [OPT pass
190 .osw
200 LDX #&50
210 LDY #2
220 JMP &FFF1
230 .osb97
240 LDA #&97
250 LDX #&30
260 JMP &FFF4
270 .read
280 JSR sub1
290 PHA
300 .loop1
310 TYA
320 PHA
330 LDA #5
340 JSR osw
350 PLA
360 TAY
370 LDA &254
380 STA &259,Y
390 INC &250
400 BNE skip1
410 INC &251
420 .skip1
430 INY
440 CPY &258
450 BNE loop1
```

Continued ▶

◀ Continued

```
 460 JMP exit
 470 .write
 480 JSR sub1
 490 PHA
 500 .loop2
 510 TYA
 520 PHA
 530 LDA &259,Y
 540 STA &254
 550 LDA #6
 560 JSR osw
 570 INC &250
 580 BNE skip2
 590 INC &251
 600 .skip2
 610 PLA
 620 TAY
 630 INY
 640 CPY &258
 650 BNE loop2
 660 JMP exit
 670 .wfloat
 680 LDY #0
 690 .loop3
 700 LDA float,Y
 710 STA &259,Y
 720 INY
 730 CPY #5
 740 BNE loop3
 750 STY &258
 760 JMP write
 770 .rfloat
 780 LDA #5
 790 STA &258
 800 JSR read
 810 LDY #0
 820 .loop4
 830 LDA &259,Y
 840 STA float,Y
 850 INY
 860 CPY #5
 870 BNE loop4
 880 RTS
 890 .wstring
 900 JSR sub1
 910 PHA
 920 .loop5
 930 TYA
 940 PHA
 950 LDA string,Y
 960 STA &254
 970 LDA #6
 980 JSR osw
 990 PLA
1000 TAY
1010 LDA &254
1020 INC &250
1030 BNE skip4
1040 INC &251
1050 .skip4
1060 INY
1070 CMP #13
1080 BNE loop5
1090 JMP exit
1100 .rstring
1110 JSR sub1
1120 PHA
1130 .loop6
1140 TYA
1150 PHA
```

Continued ▶

Rawlings listing 3 continued

```
1160 LDA #5
1170 JSR osw
1180 PLA
1190 TAY
1200 LDA &254
1210 STA string,Y
1220 INY
1230 INC &250
1240 BNE skip6
1250 INC &251
1260 .skip6
1270 CMP #13
1280 BNE loop6
1290 .exit
1300 PLA
1310 TAY
1320 JMP osb97
1330 .sub1
1340 CLC
1350 LDY #0
1360 STY &251
1370 STY &252
1380 STY &253
1390 LDX #&F4
1400 STX &250
1410 LDA #5
1420 JSR osw
1430 LDA &254
1440 PHA
1450 LDY &257
1460 JSR osb97
1470 PLA
1480 LDY &255
1490 STY &250
1500 LDY &256
1510 STY &251
1520 LDY #0
1530 RTS
1540 :
1550 ]NEXT
1560 :
1570 REM byte read/write demo
1580 PROCb(10,179)
1590 PRINTFNb(10)
1600 :
1610 REM integer read/write demo
1620 PROCt(10,1790)
1630 PRINTFNt(10)
1640 :
1650 REM floating p'nt read/write demo
1660 PROCf(10,179.32)
1670 PRINTFNf(10)
1680 :
1690 REM string read/write demo
1700 PROCs(5,"READ/WRITE")
1710 PRINTFNs(5)
1720 END
1730 :
1740 REM write byte
1750 DEF PROCb(n,v)
1760 !&255=b+n
1770 ?&257=bk
1780 ?&258=1
1790 ?&259=v
1800 CALL write
1810 ENDPROC
1820 :
1830 REM read byte
1840 DEF FNb(n)
```

Continued ▶

◀ Continued

```
1850 !&255=b+n
1860 ?&257=bk
1870 ?&258=1
1880 CALL read
1890 =?&259
1900 :
1910 REM write integer
1920 DEF PROCt(n,v)
1930 !&255=t+n*4
1940 ?&257=bk
1950 ?&258=4
1960 !&259=v
1970 CALL write
1980 ENDPROC
1990 :
2000 REM read integer
2010 DEF FNt(n)
2020 !&255=t+n*4
2030 ?&257=bk
2040 ?&258=4
2050 CALL read
2060 =!&259
2070 :
2080 REM write floating point
2090 DEF PROCf(n,A)
2100 !&255=f+n*5
2110 ?&257=bk
2120 CALL wfloat
2130 ENDPROC
2140 :
2150 REM read floating point
2160 DEF FNf(n)
2170 !&255=f+n*5
2180 ?&257=bk
2190 CALL rfloat
2200 =A
2210 :
2220 REM write string
2230 DEF PROCs(n,$string)
2240 !&255=s+n*len
2250 ?&257=bk
2260 CALL wstring
2270 ENDPROC
2280 :
2290 REM read string
2300 DEF FNs(n)
2310 !&255=s+n*len
2320 ?&257=bk
2330 CALL rstring
2340 =$string
```

Listing 4. A program for use on a Solidisk board

```
  10 REM Read/Write Solidisk Vers. 2
 480 JSR sub2
 490 :
 660 RTS
 900 JSR sub2
 910 :
1090 RTS
1531 .sub2
1532 CLC
1533 LDA #&97
1534 LDX #98
1535 LDY #15
```

Continued ▶

Rawlings listing 4 continued

```
 1536 JSR &FFF4
 1537 LDX #96
 1538 LDY &257
 1539 JSR &FFF4
 1540 LDY #0
 1541 RTS
 1760 !&250=b+n
 1930 !&250=t+n*4
 2100 !&250=f+n*5
 2240 !&250=s+n*len
```

Listing 5. Checksum routine for listings 1 and 2

```
   55 MODE 6:LOMEM=&3000
  911 total%=0
  912 FOR byte%=code TO (P%-1)
  913 total%=total%+?byte%
  914 NEXT byte%
  915 IF total%<>15144 PRINT"Checksum er
ror - please check listing":END
```

Listing 6. Checksum routine for listings 3 and 4

```
   55 MODE 6:LOMEM=&3000
 1551 total%=0
 1552 FOR byte%=&260 TO (P%-1)
 1553 total%=total%+?byte%
 1554 NEXT byte%
 1555 IF total%<>23918 PRINT"Checksum er
ror - please check listing":END
```

The Last Detail, **see page 88**

Listing 1. A graphics editor which will read a screen-image file and edit it pixel by pixel to sharpen up graphics

```
   10 REM Pixel Editor
   20 REM by Mike Williams
   30 REM BBC B/B+/Master/Electron
   40 REM with disc drive(s)
   50 REM (c) Acorn User March 1986
   60 :
   70 REM store% = storage space
   80 store%=&A00
   90 IF store%+PAGE>&2200 PRINT"Reduce
value of store% in line 80 or"'"move PAG
E down and start again.":END
  100 DIM base% store%
  110 MODE 6
  120 *CAT
  130 REPEAT
  140 VDU 28,0,24,39,18,12
  150 INPUTLINE'"Enter screen name or an
y * command : "'" "file$
  160 IF ASC(file$)=42 VDU 28,0,17,39,0,
12:PROCoscli(file$):file%=0:GOTO 180
  170 IF file$="" file%=1 ELSE file%=FNc
heckfile(file$)
  180 UNTIL file%>0
  190 CLS
  200 REPEAT
  210 INPUT"Enter screen mode: "M%
```

Continued ▶

◀ Continued

```
  220 h%=4:w%=-1
  230 IF M%=0:w%=2
  240 IF M%=1 OR M%=4:w%=4
  250 IF M%=2 OR M%=5:w%=8
  260 IF w%=-1 PRINT"Not a graphics mode
"
  270 UNTIL w%>-1
  280 magnif%=SQR(1024*1280/w%/h%/store%
)+1.5
  290 W%=w%*magnif%
  300 H%=h%*magnif%
  310 WX%=1280 DIV magnif%
  320 WY%=1024 DIV magnif%
  330 WW%=(W% DIV w%-1)*w%
  340 HH%=H%-h%
  350 MODE M%
  360 VDU 23;8202;0;0;0;
  370 IF M%<3 pos$="3000" ELSE pos$="580
0"
  380 IF file$<>"" PROCoscli("LOAD "+fil
e$+" FFFF"+pos$)
  390 X%=0:Y%=0
  400 REPEAT
  410 PROCdist
  420 IF M%<3 THEN *SAVE wkfile FFFF3000
 FFFF8000
  430 IF M%>3 THEN *SAVE wkfile FFFF5800
 FFFF8000
  440 *FX 15,1
  450 IF doit%=2 MODE 6:END
  460 PROCcopydown
  470 PROCclose
  480 *LOAD wkfile
  490 IF end%=1 PROCcopyup
  500 UNTIL FALSE
  510 END
  520 :
  530 DEF FNcheckfile(file$)
  540 file%=0
  550 IF LEN(file$)<11 file%=OPENIN(file
$)
  560 IF file%<=0 PRINT"File not found"
  570 CLOSE#file%
  580 =file%
  590 :
  600 DEF PROCdist
  610 GCOL 3,3
  620 doit%=0
  630 REPEAT
  640 PROCbox
  650 *FX 19
  660 PROCbox
  670 IF INKEY(-122) AND INKEY(-1) X%=X%
+W% ELSE IF INKEY(-122) X%=X%+w%
  680 IF INKEY(-26) AND INKEY(-1) X%=X%-
W% ELSE IF INKEY(-26) X%=X%-w%
  690 IF INKEY(-58) AND INKEY(-1) Y%=Y%+
H% ELSE IF INKEY(-58) Y%=Y%+h%
  700 IF INKEY(-42) AND INKEY(-1) Y%=Y%-
H% ELSE IF INKEY(-42) Y%=Y%-h%
  710 IF INKEY(-74) doit%=1
  720 IF INKEY(-106) doit%=2
  730 IF X%<0 X%=0
  740 IF Y%<0 Y%=0
  750 IF X%+WX%>1280 X%=1280-WX%
  760 IF Y%+WY%>1024 Y%=1024-WY%
  770 UNTIL doit%
  780 ENDPROC
  790 :
```

Continued ▶

Williams listing 1 continued

```
 800 DEF PROCbox
 810 MOVE X%,Y%
 820 PLOT 13,X%+WX%,Y%
 830 PLOT 13,X%+WX%,Y%+WY%
 840 PLOT 13,X%,Y%+WY%
 850 PLOT 13,X%,Y%
 860 ENDPROC
 870 :
 880 DEF PROCcopydown
 890 b%=base%
 900 FOR i%=X% TO X%+WX% STEP w%
 910 FOR j%=Y% TO Y%+WY% STEP h%
 920 ?b%=POINT(i%,j%)
 930 b%=b%+1
 940 IF b%>base%+store% PRINT"Indirecti
on error":STOP
 950 NEXT:NEXT
 960 ENDPROC
 970 :
 980 DEF PROCcopyup
 990 b%=base%
1000 FOR i%=X% TO X%+WX% STEP w%
1010 FOR j%=Y% TO Y%+WY% STEP h%
1020 GCOL 0,?b%
1030 PLOT 69,i%,j%
1040 b%=b%+1
1050 NEXT:NEXT
1060 ENDPROC
1070 :
1080 DEF PROCclose
1090 PROCbox
1100 PROCdisplay
1110 x%=0:y%=0
1120 end%=0
1130 *FX 4,1
1140 *FX 15,1
1150 REPEAT
1160 PROCcursor
1170 *FX 19
1180 K%=GET
1190 PROCcursor
1200 IF K%=137 x%=x%+W%
1210 IF K%=136 x%=x%-W%
1220 IF K%=139 y%=y%+H%
1230 IF K%=138 y%=y%-H%
1240 IF K%=13 end%=1
1250 IF K%=127 end%=2
1260 IF x%<0 x%=0
1270 IF y%<0 y%=0
1280 IF x%>=1280 x%=x%-W%
1290 IF y%>=1024 y%=y%-H%
1300 IF K%>=48 AND K%<=57 PROCcolour(K%
-48)
1310 IF K%>=65 AND K%<=70 PROCcolour(K%
-55)
1320 UNTIL end%
1330 *FX 4,0
1340 ENDPROC
1350 :
1360 DEF PROCdisplay
1370 b%=base%
1380 FOR i%=0 TO WX%*magnif% STEP W%
1390 FOR j%=0 TO WY%*magnif% STEP H%
1400 GCOL 0,?b%
1410 MOVE i%,j%
1420 MOVE i%+WW%,j%
1430 PLOT 85,i%,j%+HH%
1440 PLOT 85,i%+WW%,j%+HH%
1450 b%=b%+1
1460 NEXT:NEXT
```

Continued ▶

◀ Continued

```
1470 ENDPROC
1480 :
1490 DEF PROCcursor
1500 GCOL 3,3
1510 MOVE x%,y%
1520 PLOT 13,x%+WW%,y%
1530 PLOT 13,x%+WW%,y%+HH%
1540 PLOT 13,x%,y%+HH%
1550 PLOT 13,x%,y%
1560 ENDPROC
1570 :
1580 DEF PROCcolour(k%)
1590 GCOL 0,k%
1600 MOVE x%,y%
1610 MOVE x%+WW%,y%
1620 PLOT 85,x%,y%+HH%
1630 PLOT 85,x%+WW%,y%+HH%
1640 b%=base%+x% DIV W%*(WY% DIV h%+1)+
y% DIV H%
1650 IF b%>base%+store% PRINT"Indirecti
on error":STOP
1660 ?b%=k%
1670 ENDPROC
1680 :
1690 DEF PROCoscli(A$)
1700 LOCAL X%,Y%
1710 $base%=A$
1720 X%=base% MOD 256
1730 Y%=base% DIV 256
1740 CALL &FFF7
1750 ENDPROC
```

6502 Special, **see page 91**

Extending HiBasic

A checksum is included in listing 1. This routine will point out any possible typing errors you have made. Note that the machine-code assembled by listing 1 is saved with the name 'M.X—HIBAS'. If you are using an ADFS then you will need to create a directory called 'M' before you start.

Listing 1. Allows mnemonics for certain codes to be included within a Basic program, giving access to the powerful HiBasic

```
 10 REM HIBASIC extended assembler
 20 REM by Martin Chaplin
 30 REM BBC B/B+ with 6502SP
 40 REM (c) Acorn User March 1986
 50 :
 60 REM RUN in the 2nd processor using
 70 REM HIBASIC
 80 :
 90 HIMEM=HIMEM-&192
100 PROCconstants
110 PROCassemble
120 PROCsave
130 END
140 :
150 DEF PROCconstants
160 offset=&A
170 pointer=&B
180 opcode=&29
190 lowbyte=&2A
200 highbyte=&2B
210 sign=&2E
```

Continued ▶

Chaplin's listing 1 continued

```
 220 realno=&30
 230 mantissa=&31
 240 opstore=&3D
 250 onebyte=&BE46
 260 complete=&BE4C
 270 branch=&BE98
 280 getbranch=&BEA1
 290 twobytes=&BECA
 300 immjoin=&BEE7
 310 rejoin=&BEEA
 320 indexedret=&BF11
 330 absoluteret=&BF51
 340 bitjoin=&BF70
 350 notinc=&BF89
 360 incdecjoin=&BF8C
 370 cpjoin=&BF98
 380 threebytes=&BFBC
 390 index=&BF2F
 400 evaluate=&C043
 410 nextbyte=&C2B6
 420 mismatch=&C429
 430 syntaxmes=&D045
 440 expression=&D333
 450 convert=&DAD4
 460 ENDPROC
 470 :
 480 DEF PROCassemble
 490 FOR pass=0 TO 3 STEP3
 500 P%=HIMEM
 510 [OPT pass
 520 .equr
 530 CMP #ASC("R")
 540 BNE syntax
 550 JSR expression
 560 BNE number
 570 JMP mismatch
 580 .number
 590 BMI real
 600 JSR convert
 610 .real
 620 LDA sign
 630 BMI negative
 640 LDA mantissa
 650 AND #&7F
 660 STA mantissa
 670 .negative
 680 LDX #4
 690 .store
 700 LDA realno,X
 710 STA opcode,X
 720 DEX
 730 BPL store
 740 LDY #5
 750 JMP complete
 760 .newopcodes
 770 LDX #2
 780 LDY offset
 790 .storeloop
 800 DEY
 810 LDA (pointer),Y
 820 AND #223
 830 STA opstore,X
 840 DEX
 850 BPL storeloop
 860 LDX #11
 870 .checkloop
 880 LDA opstore
 890 CMP first,X
 900 BNE out
```

Continued ►

◄ Continued

```
 910 LDA opstore+1
 920 CMP second,X
 930 BNE out
 940 LDA opstore+2
 950 CMP third,X
 960 BEQ found
 970 .out
 980 DEX
 990 BPL checkloop
1000 .syntax
1010 JMP syntaxmes
1020 .found
1030 LDA codelist,X
1040 STA opcode
1050 CPX #8
1060 BCC notone
1070 JMP onebyte
1080 .notone
1090 CPX #4
1100 BCC less
1110 OPT FNphx(pass)
1120 JSR evaluate
1130 LDA lowbyte
1140 CMP #8
1150 BCS syntax
1160 ASL A
1170 ROL A
1180 ROL A
1190 ROL A
1200 ADC opcode
1210 STA opcode
1220 JSR nextbyte
1230 CMP #ASC(",")
1240 BNE syntax
1250 JSR evaluate
1260 PLA
1270 CMP #6
1280 BCC bbsbbr
1290 JMP twobytes
1300 .bbsbbr
1310 LDA lowbyte
1320 PHA
1330 JSR nextbyte
1340 CMP #ASC(",")
1350 BNE syntax
1360 JSR evaluate
1370 LDA lowbyte
1380 BNE notzero
1390 DEC highbyte
1400 .notzero
1410 DEC lowbyte
1420 JSR getbranch
1430 LDA lowbyte
1440 STA highbyte
1450 PLA
1460 STA lowbyte
1470 JMP threebytes
1480 .less
1490 CPX #0
1500 BNE notbra
1510 JMP branch
1520 .notbra
1530 CPX #3
1540 BEQ stzcode
1550 JSR evaluate
1560 LDA highbyte
1570 BNE absolute
1580 JMP twobytes
1590 .absolute
1600 JMP absoluteret
```

Continued ►

Chaplin's listing 1 continued

```
1610 .stzcode
1620 JSR evaluate
1630 JSR nextbyte
1640 CMP #ASC(",")
1650 BNE notindexedstz
1660 JSR &C04E
1670 JSR nextbyte
1680 CMP #ASC("X")
1690 BEQ indexedstz
1700 JMP index
1710 .notindexedstz
1720 LDA highbyte
1730 BNE absolutestz
1740 JMP twobytes
1750 .absolutestz
1760 LDA #&9C
1770 .insert
1780 STA opcode
1790 JMP threebytes
1800 .indexedstz
1810 LDA highbyte
1820 BNE absindexedstz
1830 LDA #&74
1840 STA opcode
1850 JMP twobytes
1860 .absindexedstz
1870 LDA #&9E
1880 OPT FNbra(pass,insert)
1890 .first
1900 EQUS"BTTSBBRSPPPP"
1910 .second
1920 EQUS"RSRTBBMMHHLL"
1930 .third
1940 EQUS"ABBZRSBBYXYX"
1950 .codelist
1960 EQUB &80
1970 EQUB &4
1980 EQUB &14
1990 EQUB &64
2000 EQUB &F
2010 EQUB &8F
2020 EQUB &7
2030 EQUB &87
2040 EQUB &5A
2050 EQUB &DA
2060 EQUB &7A
2070 EQUB &FA
2080 .newmodes
2090 CMP #ASC(",")
2100 BNE notindexed
2110 JMP indexedret
2120 .notindexed
2130 LDA opcode
2140 CLC
2150 ADC #&11
2160 STA opcode
2170 JMP rejoin
2180 .bitimm
2190 CPX #&31
2200 BEQ bitcode
2210 JMP cpjoin
2220 .bitcode
2230 JSR nextbyte
2240 CMP #ASC("#")
2250 BEQ immediate
2260 JMP bitjoin
2270 .immediate
2280 LDA #&89
2290 STA opcode
```

Continued ▶

◀ Continued

```
2300 JMP immjoin
2310 .incadeca
2320 JSR nextbyte
2330 CMP #ASC("A")
2340 BEQ accaddr
2350 JMP bitjoin
2360 .accaddr
2370 CPX #&2D
2380 BCS incdec
2390 JMP notinc
2400 .incdec
2410 CPX #&2E
2420 BEQ incacode
2430 LDA #&3A
2440 .storeopcode
2450 STA opcode
2460 JMP incdecjoin
2470 .incacode
2480 LDA #&1A
2490 OPT FNbra(pass,storeopcode)
2500 .indexjmp
2510 CMP #ASC(")")
2520 BNE indirectindexed
2530 JMP threebytes
2540 .indirectindexed
2550 CMP #ASC(",")
2560 BNE error
2570 JSR nextbyte
2580 CMP #ASC("X")
2590 BNE error
2600 JSR nextbyte
2610 CMP #ASC(")")
2620 BNE error
2630 LDA #&7C
2640 STA opcode
2650 JMP threebytes
2660 .error
2670 JMP index
2680 ]
2690 NEXT pass
2700 ?&BCFC=&24
2710 ?&BEAD=?&BEAD-6
2720 ?&BEB1=?&BEB1-6
2730 ?&BEB7=?&BEB7-7
2740 ?&BED1=?&BED1-1
2750 ?&BED3=?&BED3+6
2760 ?&BED6=?&BED6-1
2770 ?&BED8=?&BED8+6
2780 !&70=!&BEC6
2790 FOR X%=&BEB9 TO &BE9B STEP-1
2800 X%?6=?X%
2810 NEXT X%
2820 $&BEC0="Range"
2830 !&BEC5=!&70
2840 FOR pass=0 TO 3 STEP3
2850 P%=&BEC9
2860 [OPT pass
2870 RTS
2880 ]
2890 P%=&BE9B
2900 [OPT pass
2910 JSR getbranch
2920 JMP twobytes
2930 ]
2940 P%=&BE25
2950 [OPT pass
2960 JMP newopcodes
2970 ]
2980 P%=&BF0D
```

Continued ▶

Chaplin's listing 1 continued

```
2990 [OPT pass
3000 JMP newmodes
3010 ]
3020 P%=&BF94
3030 [OPT pass
3040 JMP bitimm
3050 ]
3060 P%=&BF65
3070 [OPT pass
3080 JMP incadeca
3090 ]
3100 P%=&BFCD
3110 [OPT pass
3120 JMP indexjmp
3130 ]
3140 P%=&C077
3150 [OPT pass
3160 JMP equr
3170 ]
3180 P%=&B823
3190 [OPT pass
3200 NOP
3210 LDX #HIMEM MOD 256
3220 LDY #HIMEM DIV 256
3230 ]
3240 NEXT pass
3250 ENDPROC
3260 :
3270 DEF PROCsave
3280 LOCAL sum%
3290 FOR X%=HIMEM TO &F7FF STEP4
3300 sum%=sum%+!X%
3310 NEXT X%
3320 IF sum%<>&D4D5EDA2 PRINT"Check for
possible assembly error"
3330 "SAVE M.X_HIBAS "+STR$~HIMEM+" F80
0 B800"
3340 ENDPROC
3350 :
3360 DEF FNbra(pass%,posn%)
3370 [OPT pass%
3380 BNE posn%
3390 ]
3400 P%?-2=&80
3410 =pass%
3420 :
3430 DEF FNphx(pass%)
3440 [OPT pass%
3450 EQUB &DA
3460 ]
3470 =pass%
```

Listing 2. Tests the HiBasic extended assembler program

```
10 REM Extended HIBASIC test
20 REM by Martin Chaplin
30 REM BBC B/B+ with 6502SP
40 REM (c) Acorn User March 1986
50 :
60 REM Runs in 6502 2nd processeor
70 REM with the HIBASIC extension
80 :
90 ON ERROR GOTO 1000
100 MODE 3
110 VDU 14
120 CLS
130 PRINT"Test new code in assembler"
140 FOR X%=4 TO 7 STEP 3
150 P%=&3000
160 O%=&4000
170 [OPT X%
180 BRA next
```

Continued ►

◄ Continued

```
190 LDA #0
200 STA &70
210 LDA #&30
220 STA &71
230 LDX #1
240 PHX
250 PHY
260 PLY
270 PLX
280 JMP (&6F,X)
290 .next
300 ORA (&70)
310 AND (&70)
320 EOR (&70)
330 ADC (&70)
340 STA (&70)
350 LDA (&70)
360 CMP (&70)
370 SBC (&70)
380 BIT &70,X
390 STZ &70
400 STZ &70,X
410 TSB &70
420 TRB &70
430 BIT #&75
440 INC A
450 DEC A
460 TSB &3000
470 TRB &3000
480 BIT &3000,X
490 STZ &3000
500 STZ &3000,X
510 RTS
520 EQUR &70
530 EQUR 1
540 EQUR 0
550 EQUR X%
560 EQUR PI
570 EQUR SIN(RAD(45))
580 BBR0,&70,branch%
590 BBS0,&70,branch%
600 RMB0,&70
610 SMB0,&70
620 BBR1,&70,branch%
630 BBS1,&70,branch%
640 RMB1,&70
650 SMB1,&70
660 BBR2,&70,branch%
670 BBS2,&70,branch%
680 RMB2,&70
690 SMB2,&70
700 .branch%
710 BBR3,&70,branch%
720 BBS3,&70,branch%
730 RMB3,&70
740 SMB3,&70
750 BBR4,&70,branch%
760 BBS4,&70,branch%
770 RMB4,&70
780 SMB4,&70
790 BBR5,&70,branch%
800 BBS5,&70,branch%
810 RMB5,&70
820 SMB5,&70
830 BBR6,&70,branch%
840 BBS6,&70,branch%
850 RMB6,&70
860 SMB6,&70
870 BBR7,&70,branch%
880 BBS7,&70,branch%
890 RMB7,&70
900 SMB7,&70
910 ]
920 NEXT X%
930 FOR X%=0 TO &FF STEP 4
940 X%!&3000=X%!&4000
950 NEXT X%
960 CALL &3002
970 PRINT''
980 PRINT"Extended HIBASIC tested OK"
990 END
1000 CLS
1010 PRINTTAB(5,5)"Test error"''
1020 REPORT
1030 PRINT" @ Line No. ";ERL
1040 END
```

ACORN FORUM

From now on, Atom and Beeb Forums will be combined to cover all the Acorn micros. Mike Barwise and Bruce Smith kick off with a disc system explanation and Master tips

TWO OF A KIND

It is seldom realised that the Atom and BBC micro disc systems are very similar in operation. They also produce almost identical discs, which can be freely interchanged between micros, subject to the data stored being compatible with the target machine.

Joe Telford has already discussed the fundamental structure of the BBC micro disc filing system (DFS) catalogue (*AU* September '83) for version 0.9E, and the apparent similarities to the Atom DOS prompted me to investigate this subject further.

My experiments were done on an issue 5 Atom with the last issue 8271 DOS, a BBC model B with DNFS v1.2 on the network at *Acorn User*, and a B+ with DFS v2.1. The B and B+ performed identically, producing discs only marginally different from Atom discs. Throughout the following, the term DFS applies equally to all the examined BBC versions and to the Atom DOS.

The disc format is ten sectors of 256 bytes each per track – 40 or 80 track is irrelevant to the operation of the system. The catalogue contains a reference to the maximum number of sectors on the disc, and the disc is considered full only when that value will be exceeded by the requested operation.

A crucial point is that the DFS can only transfer data between disc and memory in whole sectors of 256 bytes. Apparent single byte transfers are the result of passing the data through a 256-byte-long buffer, the whole of which is transferred every time a transfer is made. The transfer is either enforced by Shutting (Atom) or Closing (Beeb) the file, or is automatic when the buffer gets full or empty during a protracted file handling routine.

The first two sectors of the disc hold the catalogue of files. Each of these two sectors is notionally divided into 32 arrays of eight bytes each. The first sector holds the majority of the disc title and all the filenames in ASCII, and the second sector contains the title extension, some overall disc parameters and data about the extent and position of each file in memory and on the disc.

Every time a command is issued to the DFS, it looks to see whether the disc has stopped rotating since the last command. If it has stopped (or has not started) the disc is spun up and a copy of the catalogue is pulled into the DFS buffer. This is at &E00 to &FFF inclusive for BBC micro users, and at #2000 to #21FF inclusive for the Atom.

If the disc is still rotating from a previous command, the spinup and catalogue pull are bypassed on the assumption that the catalogue is still valid. This speeds up sequential file handling, as it avoids the need to move the drive head away from the track where the file is located when the time between successive accesses is very short.

Every time the catalogue is amended, it is immediately written to the disc *before* the operation which caused the amendment is performed. Thus a save which aborts due to a seek error can leave the catalogue updated as if it has been successful. A common cause of this is using 80 track discs in a 40 track drive or vice-versa.

Similarly, the OPT 1 (BBC micro) and MON (Atom) displays are presented before the catalogue is updated. They therefore provide no information about the success or otherwise of the operation performed. As I write, this has been brought home to me the hard way. A clock bit missing during a save caused the catalogue of my 200k disc to be unreadable. No error message was issued, as there is no check on clock bits during a write operation. The MON display on my Atom came up valid, giving the false impression that all was hunky-dory. I did get an error message on the next attempt to read, but by that time it was too late.

The first eight bytes of the first sector contain the first eight characters of the disc titles. This is stored as true ASCII, just like the filenames in the remainder of the sector, except that the eighth byte is available to the user, not systems allocated. The eighth byte of a filename holds the directory label set by *DIR (Beeb) or the qualifier set by *USE (Atom). This byte is true ASCII for unprotected files and is negated (add 80 hex) for files protected by *ACCESS <filename> L (BBC micro) or *LOCK (Atom). The negative byte at the start of the BBC micro filename after *CAT is a conversion performed on memory only. The filename is always stored on disc in true ASCII.

It is in the first eight bytes of the second sector that the minor differences between the Atom and Beeb (and indeed between versions of the BBC) filing systems can cause curious and peculiar effects.

The first four or five bytes contain the title extension of the disc, allowing a 12 or 13 character title depending on the version of the disc filing system.

The last two bytes of the remaining three or four hold the maximum number of sectors on



Bear boards: the Bear hardware floppy disc controller for the Atom

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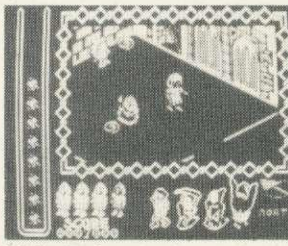
NIGHTSHADE

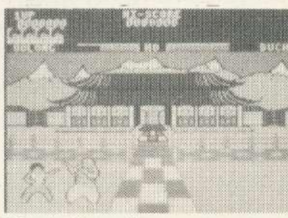
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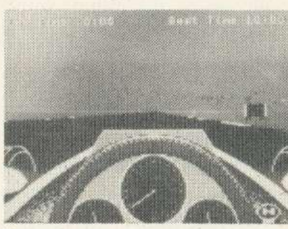
YIE AR KUNG FU

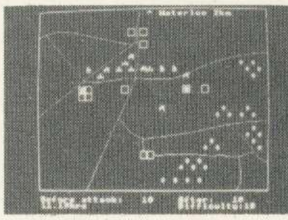
"Nothing Imagine have done compares with this. The graphics are superb and the fighting action the best I have seen. The movement of the warriors is great." (Amtix 01/86) "The graphics are excellent, each character's movements being tailored to his own particular discipline. This, combined with the wide variety of opponents, will make this the yardstick." (Popular Computing Weekly 12/85) Sticks OK. (Imagine/Kuonami) **Cassette £9.95 Disk (40/80 Track OK) £12.95**

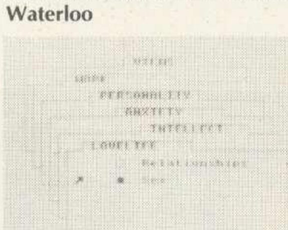

Citadel


Nightshade


Yie Ar Kung Fu


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ACORN FORUM

the disc. The number will always be 190 hex for a normally formatted 40 track disc and 320 hex for an 80 track disc. The high byte of this value has its high nibble clear (unused) so the BBC micro stores the BOOT option in it. This means that the hex content of these two locations will be 0190, 1190, 2190 or 3190 depending on the option of the disc (40t). The Atom does not use BOOT options, so it expects to find 0190 only. It interprets the whole value as the extent of the disc, so BBC micro discs with active (non-zero) BOOT options will cause the Atom some confusion, as it cannot find the end of the disc.

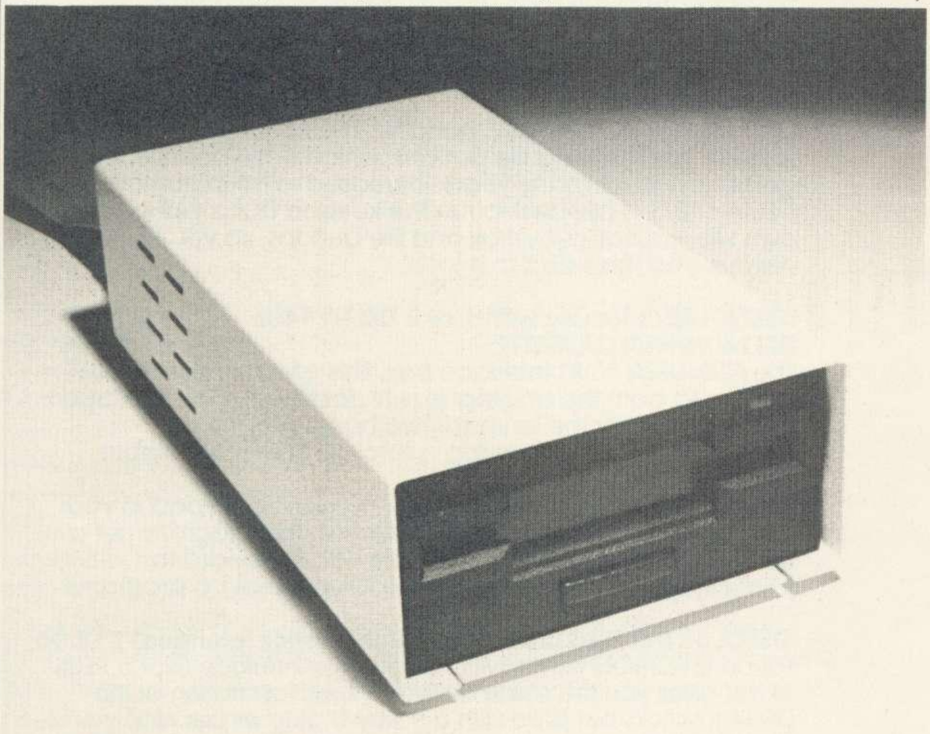
The third byte from the end of the first eight is the last filename offset. It holds the low byte of the base address of the highest filename string in memory. This value is a constant pointer to the limit of any filename search performed by the DFS. Due to the distribution of the filenames and location parameters in two parallel arrays, this single offset finds both the name and its associated parameters.

The fourth byte from the end of the eight is used by the Atom and earlier BBC micro DFS as the last character of the disc title. Later versions of the Beeb DFS, including the ones I did my research on, store the number of write accesses in this byte as a decimal number. It is initialised to zero during formatting.

The way the DFS allocates catalogue entries is identical for all versions of the DFS, including the Atom.

When a disc is formatted, the last filename offset is set to zero. This tells the system that there are no files, so even if there is garbage in the catalogue buffer, as on the Atom, it is ignored. In all the following notes, assume that the last filename offset keeps in step with the catalogue manipulations.

The first file saved starts at track 00 sector 2 of the disc. Its details are inserted in the catalogue at the lowest address in memory (base+8). Subsequent files saved before any deleting has been done are appended directly end-to-end on the disc, but each time a file is saved, the whole catalogue is copied upwards in memory. The last file saved is always at base+8 in the catalogue, and the files are always in sector number order.



The Opus 3in drive: for the BBC B and B+

As files are deleted, the catalogue above the deleted file is copied downwards in memory, overwriting the details of the deleted file. This is why deleted files are not recoverable. The remaining file details stay in sector number order, but the extent and start sector parameters of the files allow simple arithmetic to show spaces on the disc. The data on the disc itself are not moved by deletion. The data area of a deleted entry is simply freed for overwriting.

Having deleted some files, you now add some new ones. The oldest file's details are highest in memory, and the oldest file is physically nearest the start (track 00) of the disc. The DFS starts at the high memory end of the catalogue buffer and looks for a space big enough for the file you want to save. The first space it finds which is larger than the file you are saving is allocated to that file, and the file details it has skipped up to that point are copied upwards in memory. The freed space in the catalogue is used for the new file's details.

If no space large enough has been found by the time the DFS gets to base+8, the whole catalogue is copied upwards in memory and the new file details occupy base+8.

In this way, the disc is progressively filled from the outside inwards, only storing files on the next inner track if there is nowhere nearer the edge for them, and the catalogue holds the filenames in the order they are stored on the disc surface.

YOU CALLED, MASTER?

To handle all the new hardware and software fitted as standard on the Master, Acorn has implemented a number of new OSBYTE and OSWORD calls. In addition, several existing calls have been changed. Details of these are listed below.

OSBYTE

&0 (*FX0) This call returns with X containing 3. It should be entered with X<>0. Typing *FX0 will return OS3.20.

&14 (*FX20) As the character fonts are now fully exploded within the private RAM, parameters for the call are now ignored by the Master. *FX20 will reset to the standard font, should you wish to use other fonts.

&16 (*FX22) When issued, this causes the MOS to issue a service call (&15) to the sideways ROMs/RAM 100 times every second. ROMs can therefore use this as a polling interrupt.

&17 (*FX23) When this is issued, the MOS will cease the polling interrupt as detailed above.

&6B (*FX107) This is the software switch to select between the internal and external 1MHz bus. Entering with X=0 will select the external bus (default); X=1 will select the internal bus. *FX107,0 selects the external bus and *FX107,1 selects the internal bus.

&6C (*FX108) This call allows shadow memory or main memory to be selected immediately and without mode change. X=0 selects shadow memory and X=1 selects standard main memory to map the screen. *FX108,0 selects the shadow memory and *FX108,1 selects normal memory.

&6D (*FX109) When issued this call will

make a temporary filing system into a permanent one (I'm still investigating this one – BS).

&70 (*FX112) This allows you to specify where you write to when accessing the screen. With X=0 you write to the memory specified in the mode change. If X=1 you write to the main memory and if X=2 you write to shadow memory. Therefore *FX112,0 writes to memory specified by mode; *FX112,1 writes to main memory; and *FX112,2 writes to shadow memory.

&71 (*FX113) With this call you can define what memory is displayed, so it's a very useful way of screen switching for animation and so on. With X=0 the display specified by the mode change is displayed; if X=1 main memory is displayed; if X=2 then shadow memory is displayed.

Therefore *FX113,0 displays mode specified memory; *FX113,1 displays main memory; and *FX113,2 displays shadow memory.

Listing 1 shows just how fast this screen switching facility is. First write to normal memory, then to shadow memory – note that HIMEM must be set so that corruption of the main memory screen will not occur. Switching between main and shadow screen is, for normal purposes, instantaneous.

&72 (*FX114) On the BBC B+ and Master, this is the machine level of *SHADOW. *FX114,0 means use shadow memory at next mode change and *FX114,n means use mode defined at next mode change.

&84 (*FX132) This call has been changed. It now reads the top of user RAM (as opposed to formally returning the display RAM start address). On exit X and Y contain the address.

&85 (*FX133) This has been changed so that it now reads the top of the user RAM for a given mode change (as opposed to reading the bottom of display RAM address for a specified mode). On entry to the call, X should hold the mode number. On exit, X and Y will contain the address.

&A1 (*FX161) This call allows the 50 bytes of battery backed CMOS RAM to be read. The bytes 39 to 49 are available for the user to do with as wished. Bytes 30 to 38 are for third-party ROM software. On entry, X contains the byte number and on exit the byte content is returned in Y.

&A2 (*FX162) This allows any of the 50 bytes of CMOS RAM to be written to. X should contain the number of the byte to be written to, and Y the value to be written to it.

&A4 (*FX164) A new call, allowing the user to check the processor type.

&A5 (*FX165) Another new call, allowing the output cursor position to be read.

&B3 (*FX179) This call has been changed. It now allows the ROM polling semaphore, as defined with *FX22 and *FX23, to be read and written to directly. Y should be set to 0 and X should hold the new state. On exit, X will contain the previous state of the semaphore.

This call was previously read/write OSHWM – this has no significance now as the font is always fully exploded.

&EE (*FX238) This allows the base value generated by the numeric keypad to be altered. X should hold the new base character. The default value for '0' is 48.

&FA (*FX250) Read memory area used for writing to.

&FB (*FX251) Read memory area used for reading from.

&FE (*FX254) This call has been changed. It now controls the effect of Shift on the numeric pad. X=0 then Shift has an effect. X<>0 then the effect of Shift is deleted.

However, in the B and B+ this call returned the RAM size.

OSWORD

There are two new OSWORD calls provided and these are for reading and writing to the CMOS clock.

&E (14) Read CMOS clock.

&F (15) Write to CMOS clock.

It should not normally be required to write to the CMOS clock, other than to allow for any time changes.

```
 10 REM Master Screen
 20 REM Switching
 30 REM by Bruce Smith
 40 REM for Master 128
 50 REM (c) Acorn User
 60 REM March 1986
 70 :
 80 *SHADOW 1
 90 MODE 2
100 PROCtri
110 *SHADOW
120 MODE 2
130 HIMEM=&3000
140 GCOL 0,1
150 PROCtri
160 REPEAT
170 *FX 113,1
180 key=GET
190 *FX 113,2
200 key=GET
210 UNTIL 0
220 :
230 DEF PROCtri
240 MOVE 0,0
250 MOVE 1000,0
260 PLOT 85,500,1000
270 ENDPROC
```

Listing 1. Shows how fast screen switching is

The parameter block will contain the details as an ASCII string terminated by a Return character. A typical string is:

Mon.3 Feb 1986.17:49:00

Service calls

In addition to the new OSBYTE and OSWORD calls, 12 new ROM service calls are issued by the MOS. Details of these are:

21 (&15) Polling interrupt. This call is made by the MOS 100 times per second after *FX22 has been issued. On receipt of *FX23 the call is canceled.

24 (&18) Interactive *HELP. This call is issued by the MOS after it has polled each ROM with service call 9, ie, *HELP. It allows ROMs to provide an extra *HELP facility if they so desire.

For example, the Advanced Network Filing System (ANFS) will look to the fileserver for a file called !HELP.

33 (&21) Indicates static workspace in private RAM. This call is made on reset – the workspace begins at &C000 in the private RAM and may only be used by a filing system.

34 (&22) Claim Dynamic Workspace. This call should be trapped by ROMs wishing private workspace in preference to call 2. Room in the private RAM can then be claimed by the intercepting ROM. Note that it is still possible to intercept call 2 in the normal manner but this will have the effect of raising the value of PAGE.

35 (&23) This tells the ROM where the top of the static workspace in the private RAM is.

36 (&24) This call is issue by the MOS so that ROMs can tell it how much memory in private RAM they will claim when service call 24 is issued.

37 (&25) When received, the current filing system should inform the MOS of its name and associated information.

38 (&26) Close all files. When received, the filing system should select itself, close all open files and then de-select itself.

39 (&27) A hard reset has occurred, ie, power on or CTRL-Break.

40 (&28) Issued when the MOS encounters an unknown *CONFIGURE option.

41 (&29) Issued when the MOS encounters an unknown *STATUS option.

42 (&2A) A ROM-based language is being started up.

On a hard reset service calls are issued in the following order: 0F 24 21 22 01 02 23 25 FE

Please send any contributions, thoughts or ideas to Acorn Forum, Acorn User, *68 Long Acre, London WC2E 9JH. Please note that we cannot return any submissions.*

OPTIONS FOR ASSEMBLING

Peter Clements of Torquay has developed a rather useful utility for those who have Basic 2 and like to write long assembler programs. Peter's program allows you to assemble machine code to disc or even tape. Peter explains:

Assembling machine code is very memory-intensive: space is needed for the assembler program that contains the source code as well as the assembled machine code. Also remember that space is needed for the Basic stack to handle variables used for labels, in addition to more stack space when any functions or procedures are called.

My method allows you to assemble code directly to disc or tape. It relies on the extra OPT functions provided with Basic 2. OPTs 4 to 7 allow machine code to be assembled in one place but will generate machine code to run elsewhere – particularly useful when writing machine code for sideways RAM. The variable P% points to the run address and O% points to the assembly address, ie:

P% = &8000 : O% = &5000

will assemble machine code to run at &8000 but will store it from &5000.

Listing 1 assembles and saves a program called GRAB. When used in an assembly language program machine code can, as it is assembled, be diverted to a previously opened file. It only works with Basic 2 as it uses OPT 4 - 7. The program sets O% to &7900, and forms a 3 page buffer, then initiates an interrupt program that waits for whole pages to be assembled and sends them to an open file using BPUT. O% is then adjusted backwards one page. When assembly is finished, another program is called to save any odd bytes left over and to turn off the interrupts.

The variable 'flag' is used to keep track of the interrupt state. Interrupts must be re-enabled while the page is being saved. The flag prevents the program from being re-entered by another interrupt before it has finished processing the last.

Listing 2 shows how the program should be used in practice. It assembles a simple machine code routine that prints the character set on to the screen. You will need to have the GRAB program either on disc or already installed in memory. Line 90 should be adapted to contain your own filenames as required. To use this program simply insert your own assembler between lines 190 to 270, renumbering the whole program as required.

For those using the cassette filing system, the additions in listing 3 can be added to listing 2. This will reduce the inter-block gaps to that of a *SAVEd area of memory and adjust the BPUT header to include the load address of the machine code. Note, though, the execution address cannot be added as it will not be known before assembly takes place – unless, of course, it is the same as the load address.

For those using disc, listing 4 has additional lines that can be added to listing 2. It uses OSFILE to change both the load and execution address of the file after assembly is complete. The filename should be altered accordingly in line 320, and similarly line 350 should be adapted to hold the correct execution address for the file.

```
10 REM Acorn Forum
20 REM File assembler
30 REM by Peter B Clements
40 REM BBC B/B+/128/Master 128
50 REM (c) Acorn User March 1986
60 :
70 MODE 7
80 HIMEM=&7800
90 :
100 vt1lo=&FE64
110 vt1hi=&FE65
120 vacr=&FE6B
130 vifr=&FE6D
140 vier=&FE6E
150 offset=&043C
160 aint=&00FC
170 irq1v=&0204
180 osfind=&FFCE
190 osbput=&FFD4
200 :
210 code=&7800
220 FOR pass=0 TO 3 STEP 3
230 P%=code
240 [OPT pass
250 .initialise
260 JMP init
270 .sendX
280 EQUB 0
290 :
300 .close
310 LDA #&40
320 STA vier
330 SEI
340 LDA vec+0
350 STA irq1v+0
360 LDA vec+1
370 STA irq1v+1
380 CLI
390 :
400 .closeL
410 LDA offset+1
420 CMP #page1 DIV 256
430 BCC closeE
440 JSR output
450 BEQ closeL
460 :
470 .closeE
480 LDA offset+0
490 BEQ closeF
500 LDX #0
510 LDY channel
520 :
530 .closeR
540 LDA page0,X
550 JSR osbput
560 INX
570 CPX &43C
580 BNE closeR
590 :
600 .closeF
610 LDA #0
620 JMP osfind
630 :
640 .output
650 LDX #0
660 LDY channel
670 DEC offset+1
680 :
690 .outputL
700 LDA page0,X
710 JSR osbput
720 LDA page1,X
730 STA page0,X
740 LDA page2,X
750 STA page1,X
760 INX
770 BNE outputL
780 RTS
790 :
800 .badinit
810 BRK
820 EQUB 0
830 EQUS "ERROR"
840 EQUB 0
850 :
860 .init
870 STA channel
880 LDA #interrupt DIV 256
890 CMP irq1v+1
900 BEQ badinit
910 SEI
920 LDA irq1v+0
930 STA vec+0
940 LDA #interrupt MOD 256
950 STA irq1v+0
960 LDA irq1v+1
970 STA vec+1
980 LDA #interrupt DIV 256
990 STA irq1v+1
1000 LDA #page0 MOD 256
1010 STA offset+0
1020 LDA #page0 DIV 256
1030 STA offset+1
1040 LDA #&C0
1050 STA vacr
1060 STA vier
1070 LDA #&00
1080 STA vt1lo
1090 STA flag
1100 STA sendX
1110 LDA #&FF
1120 STA vt1hi
1130 CLI
1140 RTS
1150 :
1160 .wrong
1170 JMP (vec)
1180 .interrupt
1190 LDA vifr
1200 BPL wrong
1210 AND vier
1220 AND #&40
1230 BEQ wrong
1240 LDA vt1lo
1250 BIT flag
1260 BMI exit
1270 LDA sendX
1280 LSR A
1290 EOR #&03
1300 BEQ send
1310 LDA #page0 MOD 256
1320 STA offset+0
1330 LDA #page0 DIV 256
1340 STA offset+1
1350 :
1360 .exit
1370 LDA aint
1380 RTI
1390 :
1400 .send
1410 LDA offset+1
1420 CMP #page2 DIV 256
1430 BCC exit
1440 LDA aint
1450 PHA
1460 TXA
1470 PHA
1480 TYA
```

Continued page 130 ▶

◀ Continued from page 129

```
1490 PHA
1500 DEC flag
1510 CLI
1520 JSR output
1530 SEI
1540 INC flag
1550 PLA
1560 TAY
1570 PLA
1580 TAX
1590 PLA
1600 RTI
1610 .vec
1620 EQUW 0
1630 .channel
1640 EQUB 0
1650 .flag
1660 EQUB 0
1670 ]
1680 page0=code+&100
1690 page1=code+&200
1700 page2=code+&300
1710 NEXT
1720 :
1730 REM Checksum
1740 total%=0
1750 FOR byte%=code TO P%-1
1760 total%=(total%*17+(?byte%)*13
+23) MOD 52267
1770 NEXT byte%
1780 IF total%<>18332 THEN PRINT"C
hecksum error - please check listin
g":END
1790 *SAVE GRAB 7800+100 FFFF8023
FFFF7800
```

Listing 1. This listing assembles and saves a program called GRAB

```
10 REM Acorn Forum
20 REM File Assembler Example
30 REM by Peter B Clements
40 REM BBC B/B+/128/Master 128
50 REM (c) Acorn User March 1986
60 :
70 MODE 7:HIMEM=&7800
80 *LOAD GRAB
90 :
100 A%=OPENOUT"TEST"
110 REM Initialise Interrupts
120 CALL &7800
130 :
140 code=&E00
150 FOR pass=4 TO 7 STEP 3
160 P%=code:O%=&7900
170 REM Inform M/code of pass
180 ?&7803=pass
190 [OPT pass
200 LDA #7
210 JSR &FFE3
220 LDX #32
230 .loop
240 TXA
250 JSR &FFE3
260 INX
270 BPL loop
280 RTS
290 ]NEXT
300 REM Close File
310 CALL &7804
```

Listing 2. Shows how the program should be used in practice

```
101 *OPT 0,0
102 *OPT 3,6
141 !&038C=code
142 !&0390=&FFFF0E00
321 *OPT 0,0
```

Listing 3. Add to listing 2 if using cassette

```
330 $&7900="TEST"
340 !&7A00=&7900
350 !&7A02=code
360 !&7A06=&FFFF0E00
370 Y%=&7A:X%=&00
380 A%=2:CALL &FFDD
390 A%=3:CALL &FFDD
```

Listing 4. Add to listing 2 if using disc

CLARES №1 IN UTILITY SOFTWARE!

REPLICA III £15.00

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The originators of TAPE to DISC utilities on the BBC Micro now bring you the all new improved REPLICA III and its better than ever. REPLICA III is the most powerful disc based TAPE to DISC utility available and will now transfer more programs than ever before. Just look at the features below and place your order now by ACCESS or cheque.
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*COMPATIBLE WITH BOTH 8271 & 1770 DFS
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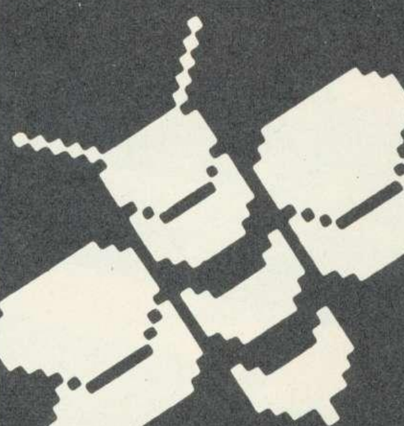
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WHAT IS DATABASE?
It is a FILE containing RECORDS , each record consists of a number of FIELDS containing the information - an analogy can be drawn with a card index in which a box of cards is the file, each card is a record and each line on the card is a field.

SPECIFICATION

1) Random Access	- disc based, single or dual drives
2) File Size	- max 65,000 records
3) Record Size	- up to 2048 characters and 200 fields
4) Field Size	- up to 254 characters
5) Holds	- approx 1200 ADDRESS records per 100k
6) Search	- 5 search fields using powerful options
7) Sort	- 500 records on 3 fields in 60 seconds.

SYSTEM FEATURES
*CALCULATE - using any valid expression
*PRINTOUT - Powerful options
*REDEFINE - Titles, fields etc.
*TRANSFER - From one file to another
*GLOBAL ENTRY - of repetitive data
*SEARCH LISTS - Allow creation of sub Databases within main Database
*SPOOLER - enables you to create spooled files that are compatible with Wordwise, View etc.
*INPUT - is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the utilities disc were written using this procedure
*TUBE - compatible with the 6502 second processor
*Comprehensive manual and tutoria!.
"We use Beta-Base ourselves"
Mike Bibby Editor of MICRO USER
"Beta-base is a joy to use" BEEBUG March 85
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*Beta-Base compatible
This is the first module in an integrated accounting suite of programs written to be used and not simply to please an accountant. This module contains an INVOICE and DELIVERY NOTE program with 80 column input and screen editing, you see what will be printed before committing yourself. Customer details can be automatically placed in a Beta-Base compatible file for use as a mailing list.
VAT details are generated at the end of the VAT period and the YEAR TO DATE figures can be viewed at any time. Provision is made for multiple VAT rates including standard, zero, export and exempt.
A transaction file is generated for account customers for use with the STATEMENT and ACCOUNTS RECEIVABLE module.
Future modules will be STATEMENT and ACCOUNTS RECEIVABLE, STOCK CONTROL, ACCOUNTS PAYABLE and NOMINAL LEDGER.
All relative files are compatible with CLARES Beta-Base which can be used to manipulate the files as required. The Beta-Base Utilities Disc provides Mail-Merge facilities using the customer list.
This program was written for our own use and is used to prepare hundreds of invoices per week. We have made life as easy as possible for ourselves, so why not take advantage of our efforts.
Requires double sided single drive for minimum configuration - no stock control or customer database. Double sided twin drives will enable a full integrated system to be used.

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40 80 3"

Extend the power of Beta-Base with the extra facilities provided on this disc.

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*LABEL PRINTER
*DISC SORT
*EXTENDED SEARCH
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*STATUS

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BUSINESS

NEWS

Inter-esting news from CC

Computer Concepts announce that Master versions of the *Inter* series are on the way, and the latest version of *Wordwise Plus* works on the new micro.

Inter Base will probably be released in May and *Inter Word* in April. A Master cartridge with all four *Inter* products will arrive around the same time.

The latest *Wordwise Plus* (version 1.4D) works on the Master, B+, shadow RAM boards from Aries and Watford, and the 6502 second processor. 'Hi' versions using the extra 6502 memory are supplied as a disc to use with the ROM for £4.95.

Finally, we got the price of *Wordwise Plus* wrong last month. It should have been £56.35.

Dial the help line

The Small Business Support Group has been set up to help those using micros. It will offer phone support, newsletter, access to publications and public domain software, and a bulletin board run on the One To One electronic mail system (the facilities would be free to subscribers). The group aims to cover CP/M, MS-DOS and BBC users. Contact: Microcomputer User Publications, Freepost, Weston-sub-Edge, Chipping Campden, Glos GL55 6BR.

Through the glass

The shop window keypads covered in January's issue are attached to the inside of the window and sense people's fingers through the glass. A BBC micro version costs £210, including software to control a disc carousel of graphics or text. Contact R P Binstead, 15 Seely Rd, Nottingham NG7 1NU.

PC-DOS for the Beeb?

by David Kelly

Acorn has offered a ray of hope to BBC micro owners hoping to upgrade their machines to use expansion units and facilities developed for the new Master series.

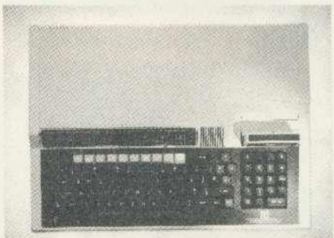
The main avenue under development is adding the Master board to match the business-oriented 512 featuring the DOS Plus operating system which runs the GEM graphics system.

The Master 128 micro can be built up with a range of co-processor boards into an impressive choice of models giving 16- and 32-bit computing power. The upgrade to Master 512 gives the fashionable mouse-windows WIMP environment using Digital Research's GEM software already available for the IBM PC and Atari ST.

Also, with Digital's DOS Plus, the Master 512 will run the CP/M-86 operating system, as well as giving some compatibility with IBM PC software.

Unfortunately at present these new expansion boards can only be used with the basic Master 128 model, Acorn's replacement for the BBC B, BBC B+ and BBC+ 128 machines.

But, according to Acorn's BBC



Master: upgradable to GEM and DOS

micro project manager Bob Coates, Acorn is now looking seriously at offering BBC owners Master-style expandability. 'More development work is needed before the BBC B can be upgraded like the Master series to be DOS Plus and PC-compatible with GEM,' he said. 'But you can take it that Acorn is very much alive to the commercial opportunity offered by being able to provide GEM and PC-DOS compatibility to existing BBC B owners.'

Brian Long, managing director of Acorn, has also raised the possibility of putting DOS Plus into ROM, but a Digital spokesman stressed that this would only be done when the system had been well tried and tested.

The BBC B+ and the Master 128 are not directly compatible because the buffering on the Tube interface used to connect the co-processor expansion units for the Master series is different from that used by the BBC B.

● A 'pointer' ROM chip to give mouse control of software such as *View* is being developed for the Master.

We show you your future

Business is the flavour of the month in our next issue, with a special look at the options facing BBC owners, or those thinking of buying a Master.

There is now an immense range of choice for small businesses, from Computer Concepts and Acorn software through to second processors and now the options offered by the Master.

Should BBC owners upgrade to a Master? If so, which one? Are the second processors a viable upgrade path? What are the advantages in waiting for DOS Plus on the new machine?

All these questions and many more we hope to answer next month so that your choice of hardware and software will be as informed and precise as possible.

BUSINESS TOP FIVE

	Title	Publisher	Cassette	Disc	ROM	Electron	Shadow on B+	6502	Econet
1	Mini Office	Database	£5.95	£7.95	—	Yes	Yes*	*	—
2	Speech	Superior	£9.95	£11.95	—	—	—	—	—
3	Music System	Island Logic	£14.95	£29.95	—	—	Yes	—	—
4	Typing Tutor	Pitmansoft	£8.65†	£13†	—	£8.65†	—	—	—
5	Forth	Acornsoft	—	—	£49.85	—	Yes	Yes	Yes

Compiled by Gallup from MicroScope. *Contact publisher: Database, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY, 061-480 0171; Superior Software, 69 Leeds Road, Bramthorpe, Leeds, W. Yorks, (0532) 459453; Island Logic, 12 Collegiate Crescent, Sheffield S10 2BA, (0742) 682321; Pitmansoft, 128 Long Acre, London WC2E 9AN, 01-379 7383; Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD, (0223) 214411.

†3 inch disc

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"Just by one simple connection the Graduate transforms the BBC into an IBM compatible with sufficient professional computing power to assist in all aspects of a business"

"The TORCH Graduate represents what most people would probably regard as the 'Ultimate Upgrade' for the BBC Micro"

"For comparison, an IBM PC with 256K of RAM, a parallel printer port and a colour card, two 5¼" disc drives of 360K each plus the keyboard, would cost £2,680"

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C P / M

HOW TO STAR IN CP/M

Alistair Birch presents a patch that makes the use of star commands both elegant and easy

When using CP/M on the Acorn Z80 second processor it is often necessary to execute 'star' commands such as *FX5 to perform printer selection or *CAT to see if a disc is formatted for use by CP/M or the standard Acorn DFS. This can be done either by going into BBC BASIC or using the STAR.COM program supplied on the utilities disc. Both of these methods are inelegant in that they require the correct disc to be loaded and there is then a time-wasting disc access.

However, listing 1 (page 137) is a patch to CP/M which will allow * commands to be entered directly to the normal CP/M A> or B> prompt.

First you will need a copy of the utilities disc. I suggest that you use the PREPARE program on disc number one supplied with your Z80 second processor to create a new working copy, and that you avoid using your original utilities disc until you are sure that you have entered everything right and that it all works correctly.

Be sure to reply Y when asked if you wish a copy of the CP/M system to be included on your new disc, because it is this which is going to be patched.

When the new utilities disc has been created, select option O to return to CP/M and then copy BBC BASIC onto your newly created disc by typing:

PIP B: = A:BBCBASIC.COM

after the A> prompt.

Now remove the original disc and put it away in a safe place, moving the new disc from drive B: to drive A:.

Remember to type CTRL-C to inform CP/M that you have moved the discs around.

The next thing is to create an unmodified copy of CP/M. To the CP/M prompt type:

A>MOVCPM * *

When the prompt appears again, type

A>SAVE 39 CPM64.COM

Now enter the program, listing 1 on page 137. Given below are hints and tips on entering assembly code successfully, as well as details of how to use the listing from *Acorn User's* monthly program cassette.

When you have entered the program correctly, reply Y to the update question. The disc will momentarily access as CPM64.COM is altered. When this has finished, return to CP/M by typing:

>*BYE

Now all that needs to be done is to copy this modified version of CP/M onto the first two tracks of the original disc. To the CP/M prompt, type:

A>DDT CPM64.COM

When the DDT prompt appears, type:

*G0

(that is, G followed by numeric zero followed by Return). This will load a copy of CPM64.COM into memory and return you to the CP/M prompt. Now type:

A>SYSGEN

When the first prompt comes up, press Return, then capital A and then Return again. The computer will respond 'Function Complete', at which point you should type CTRL-Break to perform a hard reset.

A complete listing of the conversation necessary to successfuly patch CP/M is given in figure 1 (page 137).

You will note that the sign-on message has been modified to remind you that the patch is in position.

To the CP/M prompt, try typing:

A>*HELP

and see what you get.

The * commands can now be employed without having to use STAR.COM and furthermore, the normal CP/M commands such as DIR or ERA have not been affected and will still work.

Now that one disc has been patched, it is a relatively minor task to copy this modified version of CP/M onto all your other system discs. Type:

A>SYSGEN

and when the prompt appears type A and then press Return.

Now insert all your system discs in drive B: and type B then Return for each one.

To leave SYSGEN, simply press the Return key by itself.

How to enter the program

The most important thing to remember is that this is a BBC BASIC(Z80) program, so do not enter it and expect it to run using the standard 6502 Basic ROM!

The program is well studded with REM and other comment statements. Missing out the comment statements will have no effect on the compiled code.

According to established *Acorn User* standards, all assembler mnemonics have been given in upper case and all labels in lower.

A golden rule of entering assembly code is that after you have typed in the program, save it to disc *before* you are tempted to run it. Otherwise any typing mistake might cause the program to destroy itself and so you would have to type it all in again.

Once you have entered, saved and then run the program, the computer may point out errors in the code.

However, even when you have retyped these lines accurately and the program runs through correctly, it may be that you that you have missed out a line or two.

Because you are (at the moment) just testing that the code will assemble correctly, reply N to the update question.

If all of this has put you off entering the program altogether, you could buy a copy of the monthly program listing cassette, an order form for which is on page 103. However, since BBC BASIC(Z80) is not really designed for use with cassette, you must go through the following procedure to load the program:

Enter BBC BASIC

Type ***TAPE**
****LOAD STARPAT**
OLD
***DISC**
SAVE "STARPAT"

The program is saved on the monthly cassette and disc as a standard BBC Basic file, ie, 6502. You will need to transfer it to disc and then use the BBC Basic to BBC BASIC (Z80) transfer utility to copy it on to a CP/M disc. Consult the BBC BASIC (Z80) manual supplied with your Z80 system for more details.

CP/M

A>**MOVCPM * ***
CONSTRUCTING 64k CP/M vers 2.2
READY FOR "SYSGEN"OR
"SAVE"39 CPM64.COM"

A>**SAVE 39 CPM64.COM**

A>**BBC**
Acorn BBC BASIC Version 2.20
(C) Copyright R.T. Russell 1983
>***DIR**
A: STARPAT BBC
>**CHAIN "STARPAT"**

Checksum: 28F9

Now update CPM64.COM with the patch (Y/N)? **Y**
>***BYE**

A>**DDT CPM64.COM**
DDT VERS 2.2
NEXT PC
2800 0100
***G0**

A>**SYSGEN**
SYSGEN VERSION 1.60
SOURCE DRIVE NAME (OR RETURN TO SKIP)

DESTINATION DRIVE NAME (OR RETURN TO REBOOT) **A**
DESTINATION ON A, THEN TYPE RETURN

FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)

Figure 1. The conversation to patch CP/M

Acorn CP/M 2.2 – BIOS 1.20 with
*command patch

A>***FX 5 2**

A>***FX 7 5**

A>***FX 8 5**

A>***HELP**
Z80 TUBE 1.20
OS 1.20

A>**DIR**
A: STARPAT BBC:
SYSGEN COM:
MOVCPM COM:
BBC COM
A: CPM64 COM:
DDT COM

Figure 2. *commands can now be mixed freely

```
   10 REM '*' command patch for CP/M
   20 REM by Alistair Birch
   30 REM BBC with Z80 SP
   40 REM (c) Acorn User March 1986
   50 :
   60 REM Ascii Codes
   70 cr=&0D
   80 :
   90 REM Bdos
  100 bdos=&0005
  110 pstring=&09
  120 :
  130 REM Acorn OS
  140 oswrch=&FFEE
  150 oscli=&FFF7
  160 osnewl=&FFE7
  170 :
  180 REM Bios
  190 user=&EA33
  200 stack=&EA92
  210 :
  220 REM Ccp
  230 patch=&D5A2
  240 buffer=&D406
  250 blen=buffer+1
  260 btext=buffer+2
  270 :
  280 REM Other constants
  290 offset=&CB80
  300 :
  310 DIM D% 1000
  320 :
  330 FOR I%=4 TO 6 STEP 2
  340 P%=user
  350 O%=D%
  360 :
  370 [opt I%
  380 JP title
  390 ;
  400 ; CCP comes here instead of going
  410 ; directly to bdos to read a line
  420 .readline
  430 ; So first, read the line
  440 CALL bdos
  450 ;
  460 ; Now save the accumulator
  470 PUSH AF
  480 ;
  490 ; Obtain 1st character of command
  500 LD A,(btext)
  510 ;
  520 ; Does it begin with an asterisk?
  530 CP ASC"*"
  540 ;
  550 ; If not,  process as normal
  560 JR NZ,exit
  570 ;
  580 ; Save the CCP stack pointer
  590 ; and substitute a local one
  600 LD (temp_sp),SP
  610 LD SP,stack
  620 ;
  630 ; Save hl and de
  640 PUSH HL
  650 PUSH DE
  660 ;
  670 ; Print a return and linefeed
  680 CALL osnewl
  690 ;
  700 ; Load start addr of text into hl
  710 ; Load length of text into de
  720 ; Add to give addr of command end
  730 LD HL,btext
  740 LD DE,(blen)
  750 LD D,&00
  760 ADD HL,DE
  770 ;
  780 ; Insert a return here
  790 LD (HL),cr
  800 ;
  810 ; Load hl with addr of modified
  820 ; command and call
  830 LD HL,btext
  840 CALL oscli
  850 ;
  860 ; Overwrite command with Os, so
  870 ; that CCP ignores what was typed
  880 LD A,0
  890 LD (blen),A
  900 :
  910 ;
  920 ; Restore de and hl
  930 POP DE
  940 POP HL
  950 ;
  960 ; Restore the CCP stack pointer
  970 LD SP,(temp_sp)
  980 ;
  990 ; Tidy exit routine
 1000 .exit
 1010 ; Restore the accumulator
 1020 POP AF
 1030 ;
 1040 ; and return
 1050 RET
 1060 ;
 1070 ; Store for CCP stack pointer
 1080 .temp_sp
 1090 DEFW &0000
 1100 ;
 1110 ; Print title message
 1120 .title
 1130 ;
 1140 ; Output the string and return
 1150 ; directly
 1160 LD C,pstring
 1170 LD DE,title_string
 1180 JP bdos
 1190 ;
 1200 ; Title string
 1210 .title_string
 1220 DEFM "with Acorn User * patch"+CHR
$11+CHR$11
 1230 DEFM "$"
 1240 ]
 1250 :
 1260 NEXT
 1270 :
 1280 REM Does the user want to update C
PM64.COM ?
 1290 REPEAT
 1300 INPUT "Update CPM64.COM with the p
atch (Y/N)";yesno$
 1310 yesno$=CHR$(ASCyesno$ AND NOT 32)
 1320 UNTIL yesno$="Y" OR yesno$="N"
 1330 IF yesno$="N" THEN END
 1340 :
 1350 REM Open the file for update
 1360 F%=OPENIN"CPM64.COM"
 1370 :
 1380 REM Write patch into user
 1390 REM boot space
 1400 PTR#F%=user-offset
 1410 FOR L%=0 TO O%-D%-1
 1420 BPUT #F%,D%?L%
 1430 NEXT
 1440 :
 1450 REM Update CALL 5 in CCP to
 1460 REM point to patch
 1470 PTR#F%=patch-offset
 1480 BPUT #F%,readline MOD &100
 1490 BPUT #F%,readline DIV &100
 1500 :
 1510 REM Close the file and end
 1520 CLOSE#F%
 1530 END
```

Listing 1. The patch enabling use of star commands from CP/M by Alistair Birch

WE OFFERED THEM A CHALLENGER THEY GAVE US BACK A CHAMPION

After testing the new 3 in 1 Challenger disc drive system from Opus Supplies, Britain's three leading BBC micro magazines were clearly impressed. After all Challenger is the fastest disc link-up ever with no complicated interface connections, soldering or track cutting. No wonder this remarkable plug-in disc drive, double-density disc interface and super fast 256K RAM disc combination is currently taking the market by storm.

A&B COMPUTING

THE VERDICT

"Opus have got a winner on their hands. If you are looking for a disc upgrade you can't go far wrong by buying a Challenger, even if you already have a single drive this would certainly be a sensible upgrade path. This certainly gets my vote as best buy of the year."
A & B COMPUTING – JANUARY 1986

RAM DISC PERFORMANCE

"Here is the pièce de résistance of the whole system – a 256 K RAM disc. I honestly don't know how Opus can do it for the price.

Using the RAM disc is a real dream with disc based applications. Getting back to the actual performance of Spellcheck II, with the dictionary disc set up in the RAM disc, the result is amazing. When in automatic checking mode the text scrolls past so fast it is difficult to read. To put some figures on the improvement in speed, I checked a document just over 21 K long, which took 5 minutes 56 seconds on floppy and only 1 minute 7 seconds using the RAM disc."
A & B COMPUTING

ACORN USER

THE VERDICT

"At £249.95 inclusive you get the RAM disc, double-sided 40/80 track drive, Opus DDOS plus manuals and leads. Overall very good value for money, particularly if you are looking for a disc upgrade from scratch."
ACORN USER – FEBRUARY 1986

RAM DISC PERFORMANCE

"The big deal comes in the speed. Being a purely electronic device, actions such as reading and writing are performed in fractions of the time a mechanically engineered disc drive takes.

To prove the point, I ran three programs on the RAM disc and the same three on the standard Opus drive with the following results (timings in seconds):

	RAM DISC	NORMAL
1 Save 32 K memery	0.34	13.69
2 BPUT 1 to 1000	1.14	4.71
3 PRINT/1000 strings	4.64	10.17

You don't need me to point out the huge speed increases."
ACORN USER

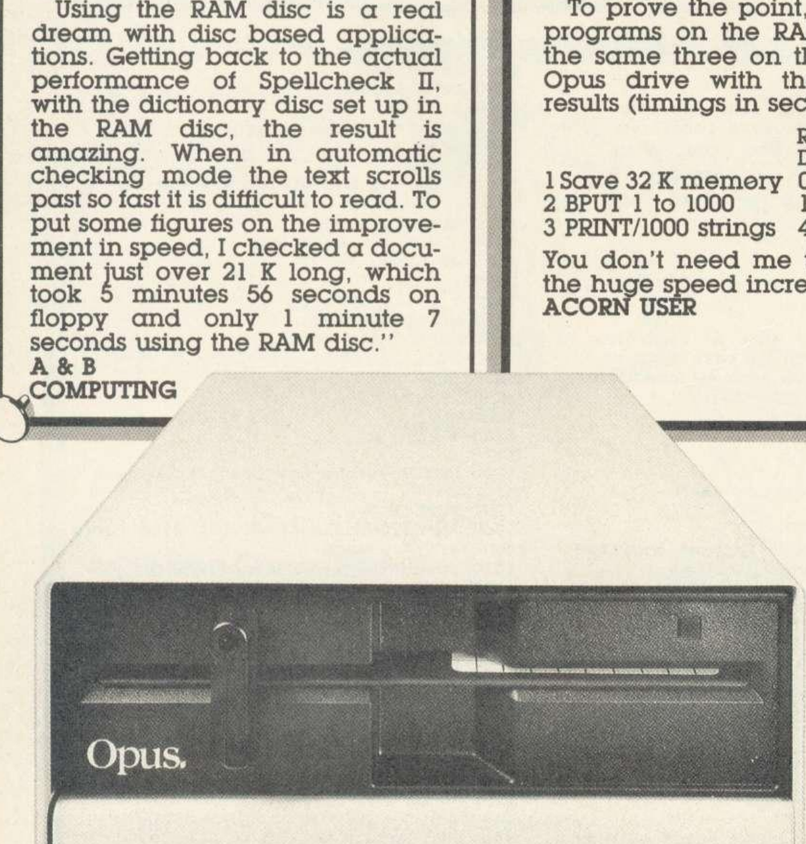
THE MICRO USER

THE VERDICT

"For the serious user Challenger could make file handling far easier and a good sight faster to use than a standard DFS as well as bringing a permanent end to 'is it 40 or 80 track, single or double density?' problems. In addition all the workspace used by a standard DFS is reclaimed and made available to the user by Challenger."
THE MICRO USER – FEBRUARY 1986

RAM DISC PERFORMANCE

"Of course it's not just a versatile disc drive, Opus also provides you with 256 K of RAM to play with. This RAM thinks it is a disc and the DDOS treats it as drive 4. If you have the 512 K version you get a drive 5 too. The RAM disc allocates sectors to files so that errors such as 'can't extend' are eliminated. In other words, it is a simple matter to use the RAM disc for most of your random access files then copy completed files from the RAM disc to a floppy disc."
THE MICRO USER



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BUSINESS

CP/M CORNER

BOOKS BY THE BUNDLE

CP/M: The Software Bus
A Clarke, J M Eaton, D Powys-Lybbe, Sigma Technical Press
An interesting book for those who already know CP/M and wish to know more about different versions. It contains interesting sections on assemblers, languages and editors.

CP/M: The Programmer's Handbook
Andy Johnson-Laird, Osborne McGraw Hill
An invaluable reference book for the experienced user or professional system implementer. Full of useful tips and programs, which are also available on a separate disc.

The Free Software Handbook 1984-1985, CP/M Edition
T Gregory Platt, Patricia Law Hatcher, Blake H Van Meter, Peopletalk Associates Inc
Another invaluable reference book, this time for the general user. It gives a host of useful programs and provides a very good introduction to the world of public domain software.

DISKIT ON SHOW

'Diskit', Resource Facilities, BBC, £4.95
Having been brought up with CP/M, it annoys me that I can not easily find out how much disc space is allocated to each file and how much is free. *Diskit* solves this problem and provides two other useful utilities. It comes as a menu driven package consisting of three programs *Stat*, *Ezicopy* and *Rename*.

Stat allows you to find out how much space is allocated to each file on a disc and how much space is free. It is well presented on the screen and includes a print option so that you can keep a hard copy. Having spent an evening using *Stat*, I now have a folder with all the relevant details about all my discs.

Ezicopy allows you to copy groups of files from one disc to another. It presents you with a list of the files on the disc, you select those that you wish to be copied and off it goes and copies them for you.

Rename allows you to rename files and directories using wildcard facilities. It is possible to rename all files with a particular extension in a specified directory, rename directories, as well as altering parts of file names.

All the programs are unprotected, which allows you to modify them if you want to. None of the programs returns to the main menu, and adding this facility greatly improves the package.

Also, *Rename* requests the drive that you wish to rename files on and then proceeds to use the current drive.

Resource Facilities have been told about these 'problems' and they will no doubt be corrected in the near future.

I have found these utilities very useful and would not be without them. Like all the other packages from Resource Facilities, they represent good value for money.

MIRRORSOFT

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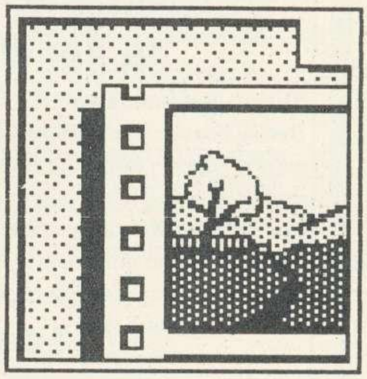
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– Dave Futcher, Educational Computing

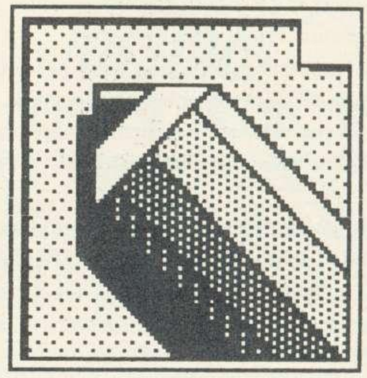
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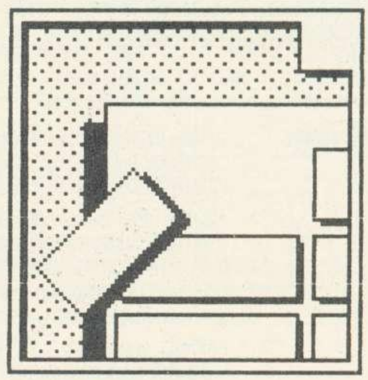
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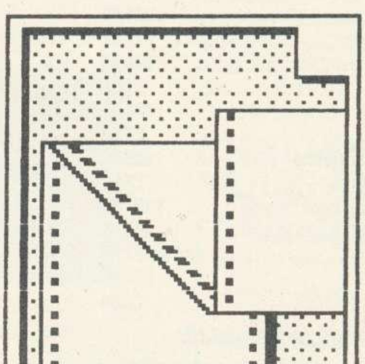
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Where you modify existing art from the Library or your own collection, or create your own. All the graphics in the Library were created here.



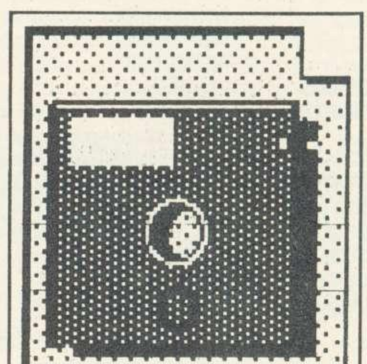
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EDUCATION

NEWS

Timetable timesaver

This is timetabling time – the term when most secondary schools witness the disappearance from the teaching arena of at least one member of staff. These poor souls are locked away to wrestle with the problems of falling rolls, overstaffing, inadequate cover in minority subjects, lack of teaching space, changing curricular objectives and GCSE requirements. All these variables provide any school with major headaches. So any tool which makes that job easier must be welcome.

Keith Johnson, whose book *Timetabling* is published by Hutchinson, has over the years developed a suite of administration programs that go further than any other packages I have seen so far. The difference between this package and others is that, if required, it will actually schedule the timetable automatically.

The suite consists of three main programs – *TT7, TT8* and *TT9.* The first is the data entry program for information relating to the school structure and its staff members. This is a once-for-all task which only needs serious amendment when the school day format is changed or there is a radical alteration in the number and style of classes.

TT8 deals with the activities to be timetabled, related to each year group. Modifications to this data can easily be carried out from year to year.

The final program, *TT9,* schedules the program in one of three fashions: interactively – that is, with the timetabler in direct control; semi-automatically – with the timetabler intervening only at certain points; or fully automatically, when the computer will produce a full timetable for a six-form entry school in about an hour.

The program will cope with 56 periods in a maximum of 10 days. The greatest number of teachers allowable is 120, with a maximum team size of 25, and the maximum number of forms or classes is 94. That means that a 15-form entry 11-16 school or a 12-form entry 11-18 school may be dealt with. Anything larger would need to be handled in chunks.

Probably the most pleasant thing about this suite of programs is that you don't need a degree in nuclear physics to drive it. Keith Johnson is obviously very well aware that the problems of teachers in administrative positions are often compounded by so-called 'sophisticated' tools.

His programs lead the user gently by the hand and carefully trap the errors that occur with monotonous frequency when one is constructing a matrix of complex information.

Three further programs, *TT10, TT11* and *TT12,* allocate names to staff ciphers, subject titles and groups and then print out timetables for each staff member in a neat and orderly fashion. *TT12* comes as an added bonus since it allocates cover for absent staff and produces 'cover slips'.

Although materials like these do not come cheaply, it must be said that the asking price of £95.45 (inc. VAT) is not a great deal, considering the time that may be saved. The three additional programs come at £40.25 inclusive.

Further details may be obtained from Keith Johnson, 120A Urmston Lane, Stretford, Manchester M32 9BQ.

New friends for Plotmate

The Plotmate Plotter from Linear Graphics is now supported by the following packages: Acornsoft's Logo, *Creative Graphics, Graphs and Charts;* AMX's *3D Zicon*; AUCBE's *Qmap* and *Quest*; Beebugsoft's *Hershey Characters* and *Superplot*; Chapman and Hall's *Numerial Analysis*; Computer Concepts' *InterChart* and *InterSheet*; Gemini's *Gemini B*; Heinemann's *Micad 2D-3D*; Ibbotson Design Software's *3D View*; Linear Graphics' *Lincad, Linchart, Linmap* and *Lintronics*; Logotron's Logo; and the MEI materials.

Free information sheets are available from Chris Teeder on (0702) 541664 ext 20 for technical information, or Marion Polley on ext 23 for general details.

ASK's four-packs



Applied Systems Knowledge (ASK) have decided to market their best four maths and English programs in sets to enable teachers more easily to gain the full benefit of their software. This altruistic gesture is also to compensate for a slump in individual package sales. The packs that have emerged as a result of this decision each contain four best-selling programs. For maths: *Table Adventures, Number Painter, Number Puzzler* and *Squeeze*; for English: *Words, Words, Words, Hide and Seek, Facemaker* and *Podd.* These items come with workbooks, puzzles and activities as well as the usual clear ASK documentation.

Still with ASK, their latest release is entitled *Pazazz,* named after that indefinable synthesis of good acting, sparkle and inspiration that makes a good production on stage.

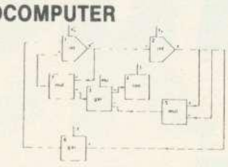
The program enables children to create music, provide a graphic background, superimpose a cartoon character and animate it. The package comes complete with four ready-to-run performances which include a breakdancer and a skeleton in a graveyard. The objective is to make children think about the component parts of any performance and come up with appropriate solutions to the problems of presentation.

Details of all these from ASK, 68 Upper Richmond Road, London SW15 2RP (01-874 6046).

Commentary by Nick Evans

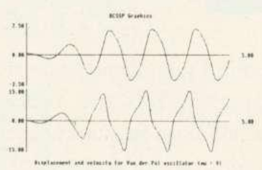
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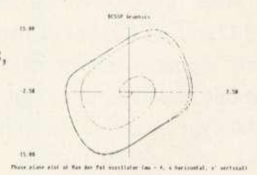


BSETR: Translates equations into the BCSSP block language.

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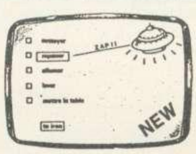
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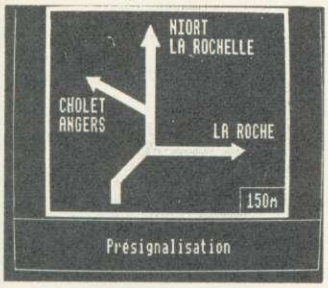
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EDUCATION

NEWS

Vive le road safety

You may remember an item on these pages last July about David Seume's electronic blackboard road safety programs which display road signs, build bikes and lights. We feature David's programs again, because the idea has taken a new twist.



In response to a request from some secondary school teachers in Birmingham, he has developed an international set of road signs complete with either French or German text.

These signs are to the same high standard as in previous programs and will provide a useful resource for teachers of modern languages who are already using the computer in their classroom.



Prices and outlets have not as yet been decided but David Seume will be glad to give you further details on request: (0483) 571417.

Highway quizzes for bike and car

The British Institute of Traffic Education Research has been producing some software and 'Life Skills' materials for use in the classroom. These cover topics as diverse as Highway Code quizzes, tutorials on roundabout navigation, overtaking and cornering, insurance of motorbikes and cars and general roadcraft for bike and motorbike users. The packages sell for around £12.50 and are available from Kent House, Kent Street, Birmingham B5 6QF (021) 622 2402.

Trade in your Logo with LSL

Logo Software Ltd has taken a new tack in marketing their LSL version of Logo. If you are interested in interfacing a Concept Keyboard or a Valiant Turtle to their Logo package, they claim you will be unable to do so unless you have LSL Logo. So the company is offering a trade-in discount of 33 per cent on LSL Logo if the purchaser returns a rival Logo chip with the order.

LSL's Marketing Director Chris Squire said: 'Many LEA advisers have rushed to choose a BBC Logo without testing it first in the classroom, taking it for granted that it would work with the Keyboard and the Turtle together. Our unique and generous offer gets them off the hook by giving them a chance to supply what their teachers are demanding, at a price they can afford.'

How far LEA advisers would go along with this, I am not sure. I feel certain that they are not all quite as naive as this press release paints them. However, for details of this offer, with LSL full price at £59.00, contact Logo Software Ltd, 316a Richmond Road, Twickenham, TW1 2PD (01-891 0989).

Playing with numbers

BBC Soft's latest release is *Number Games*, a package aimed at primary school children consisting of six programs which explain and demonstrate basic maths in game form. The programs, which have been designed to be visually stimulating as well as educationally purposeful, have been put together by SMEC, the Independent Schools Microelectronics Program. The package costs £9.95 and is Econet compatible.

Also released recently by BBC Soft is the Science Topics Software (not to be confused with the Secondary Science packs featured last month). These packages are designed to tie in with BBC2 broadcasts this spring and are entitled *Waves, Relationships, Bonding, Electromagnetic Spectrum, Electronics in Action, Newton and the Shuttle, Ecology, Polymers, The Periodic Table* and *Food and Population*. The first five titles are £17.20, the last five £23.

Prolog: the language of logic

Prolog is a logic programming language (the acronym stands for PROgramming in LOGic, not PRObably the Language Of God, as some would have it). This language is likely to be widely used in artificial intelligence programming, especially in the field of expert systems, since its fundamental principle is association of ideas and the consequent inferences that may be made from those associations.

Prolog has already been chosen by the Japanese for their fifth generation computer project and it is finding some favour in schools as a medium for inculcating logical processes.

Acornsoft, via Logic Programming Associates, has produced MicroProlog to fulfil a perceived need in this field and the package, which comes on a 16k ROM with a manual and disc, is now available (see Joe Telford's review on page 172).

EDUCATION TOP FIVE

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1	Best 4 Language	ASK	£19.95	£19.95	—	Yes	Yes	—	—
2	French Mistress	Kosmos	£8.95	£9.95	—	£8.95	Yes	—	—
3	Best 4 Maths	ASK	£19.95	£19.95	—	Yes	Yes	—	—
4	German Master	Kosmos	£8.95	£9.95	—	£8.95	Yes	—	—
5	Physics	Longman	£17.50-£22.50	—	—	Yes	—	—	*

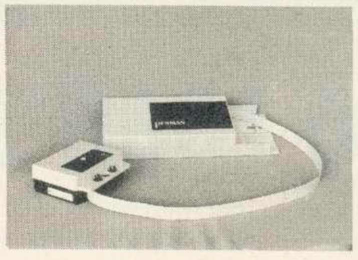
Compiled by Gallup/MicroScope. *Contact publishers: ASK, London House, 68 Upper Richmond Road, London SW15 2RP, tel: 01-874 6046; Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Beds LU5 6LX, tel: (05255) 3942; Longmans, 62 Hallfield Road, Layerthorpe, York YO3 7XQ, tel: (0904) 425 444.

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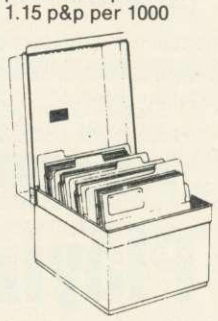
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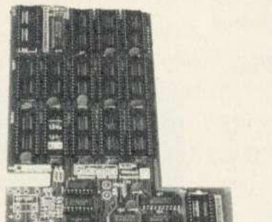
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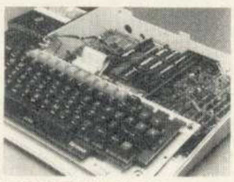
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EDUCATION

ADVENTUROUS AUTHORING

Authoring programs are probably of limited value in schools – but adventure game generators provide great scope for experimentation, analysis and creativity

Chris Drage and Nick Evans

The original brief of this month's education topic was 'authoring programs' and, although there are a few examples about they tend to fall into two distinct categories – first, programs which allow a particular function to be undertaken by 'generating' a format of presentation. Into this category falls the multiple choice test generator, the cloze test creator and the teaching program. These ideas have been found to be woefully inadequate in all but the most highly-motivated situations. Their lack of graphic appeal and their repetitive unintelligent response to the children's input makes them a hard and wearisome taskmaster. Although some use has been made of this type of program the general opinion seems to be that, other than for specialised purposes, they are best left alone.

The second category is the authoring language – altogether a different beast as this type of package enables easier access to the facilities of the computer without having to learn Basic or any other language. The drawback of this approach is that the more sophisticated the authoring package, the nearer it comes to being a language in itself – therefore its advantages have to be weighed in terms of the ease with which it 'unlocks' the special facilities of the machine for which it was written. *Microtext* from Acornsoft is probably the best example of this type of program.

Extremely valuable are packages which allow children to write their own adventures

The scope of this month's offering has been widened to include adventure game generators as they offer a facility which allows children to create their own micro-environments in which characters may be made and scenarios planned in response to project work, imaginative writing or as a result of contact with myths, legends and stories from around the world.

The most basic of authoring packages for primary schools must include the 'design-a-quiz' style programs characterised by the MEP's *Mquiz* program in the early *Micro Primer* series. Similar, more sophisticated versions are available, for example the *Answer Back Junior/Senior Quiz* from Kosmos. Whether programs of this kind should be regarded as true authoring packages is open to argument, but at least they do allow the user a chance to produce a quiz without having to write a program to do so – albeit within the rigid structure dictated by the package. Apart from this type of program the range of authoring packages is extremely limited at this level. What have proved to be extremely valuable, however, are packages which allow children to write their own adventures. The micro and the adventure program together can generate a rich, creative and imaginary world in the classroom, one that is difficult to provide any other way. It is a world of experimentation with ideas, of discussion, model building, drama and simulation.

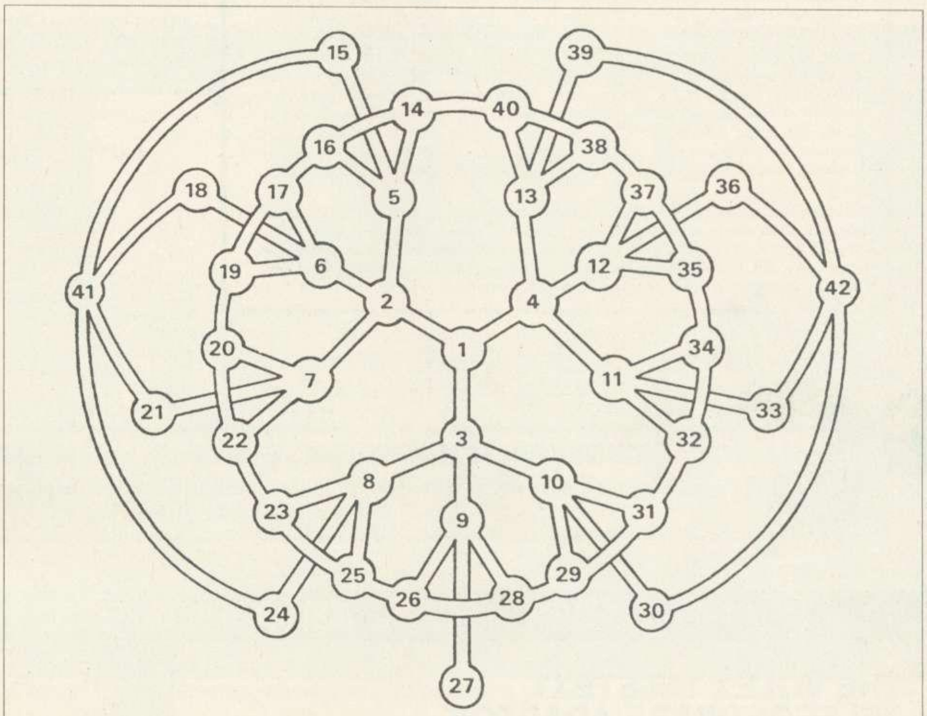


Figure 1. One of the permutations possible with the *Tombs* layout

Once the spirit for adventuring has been acquired, often through excellent programs like *Flowers of Crystal, Dread Dragon Droom* and *Tombs of Arkenstone*, it is a natural step for children to want to write their own adventures. To design and program even a simple adventure in Basic is not only complex and lengthy, it often is well outside the scope of primary aged children. Here is where a good authoring package comes into its own. A good package does not limit its range to adventure programs either. For example, with *The Last Adventure* a whole range of simulations or 'adventures' are possible right across the curriculum. Three programs I have found particularly valuable in the classroom environment are: *The Tombs of Arkenstone, Your Adventure* and *The Last Adventure*.

Having worked through the excellent adventure which forms the nucleus of the *Tombs* package, most children become motivated to 'have a go themselves'. No graphics are possible, but having experienced the thrills of *Tombs*, graphics take second place to imagination! *Make your own Adventure* opens up infinite creative possibilities and involves children in writing adventures based on the *Tombs* structure. This can be set in any time, period or location with their own clues and characters. It can be changed and refined until they are

happy with it. Figure 1 shows one of the permutations possible with the *Tombs* layout.

Your Adventure has a good screen layout and simple but effective graphics at each location. Based on a colourful and appealing screen map, it invites both teachers and children to create an uncomplicated story around the framework of locations on the map. With the planning sheets provided it's very easy to set scenes, responses, clues and help comments. The two adventures included with *Your Adventure* provide stimulus and exemplify the structure used.

One of the problems with any authoring package designed for children is the amount of time the computer is tied up. Mick Trott, the author of *Your Adventure*, has thoughtfully provided an editor which enables completed scenes to be saved and returned to later. Scenarios can be tested and, if necessary, altered. Although older juniors can make their own adventures for their friends to solve, the inability to alter the structure limits the program in this respect. However, I have used it very successfully with eight- to nine-year-olds in particular language skill areas: blends, plurals, anagrams, word associations, spelling, etc. Little computer expertise is needed by the teacher to provide enjoyable adventures on any theme or subject.

After a week's school journey to the Isle of Wight, two 11-year-olds returned motivated to write their own adventure based on locations and events on the island. *The Last Adventure* provided the ideal solution. This excellent program allows both adventures and simulations to be written – though don't expect to write a *Suburban Fox* or *Dragon World*! The suite of four programs allows you to provide descriptions of locations, set problems, and specify areas on the red function keys or Concept Keyboard. It is even possible to use the Concept Keyboard with models and figures to create a three-dimensional work area. The number of locations is limited to 16 per adventure but as entry conditions can be stipulated, several adventures may be strung together. Mode 7 graphics may be included using the simple but effective graphics editor. Mode 7 screens from other sources (*Edfax* or *Micro Viewdata*) may even be transferred to the editor for inclusion in the adventure.

With *The Last Adventure* a limitless range of applications is possible: simulations to cover environmental studies topics, historical buildings or events, places of local interest, to name a few. To demonstrate what's possible here's what five well-motivated 11-year-olds produced after working through the sample adventure, *Wiz*.

The children wanted to extend *Wiz* by creating their own sequel (figure 2). In fact they managed to complete five locations in the four hours allotted. Three aspects of their work were interesting: devising the problems and describing them; linking the scenes together; and creating the graphics. In the first, questions raised included: what to do about units? Would the user enter them? How? What to do about decimals and fractions? Too easy? Too hard? A great deal of mathematics came out of the work. Linking the scenes together proved a tremendous exercise in discussion, logic and problem solving. Creating the graphics proved easier for some than for others – due partly to the complexity of the picture they wished to create but also from the spatial and artistic skills of each child.

One of the problems with any authoring package is the amount of time the computer is tied up

A simulation based on the Springfield Environmental Studies Centre at Knowle in the West Midlands typifies this type of application for this authoring package. The SESC caters for the needs of physically disadvantaged and sensory deprived children. The Concept Keyboard overlay for this file includes a detailed map of the centre and its grounds (figure 3). This is deliberately presented with the minimum of labelling to encourage children to 'explore' the surface. Questions based on each area are presented at each location in the simulation. The support material more than adequately provides the necessary guidance.

Anyone who thinks that writing an adventure or simulation is beyond them really should seriously consider *The Last Adventure*. It provides a medium of tremendous scope yet is relatively simple to use. The pack is supported by extensive A4 documentation including Concept Keyboard overlay design sheets, function key templates, a graphics planner and a superb sample adventure.

So far we have looked at how children in primary schools might best tackle creating

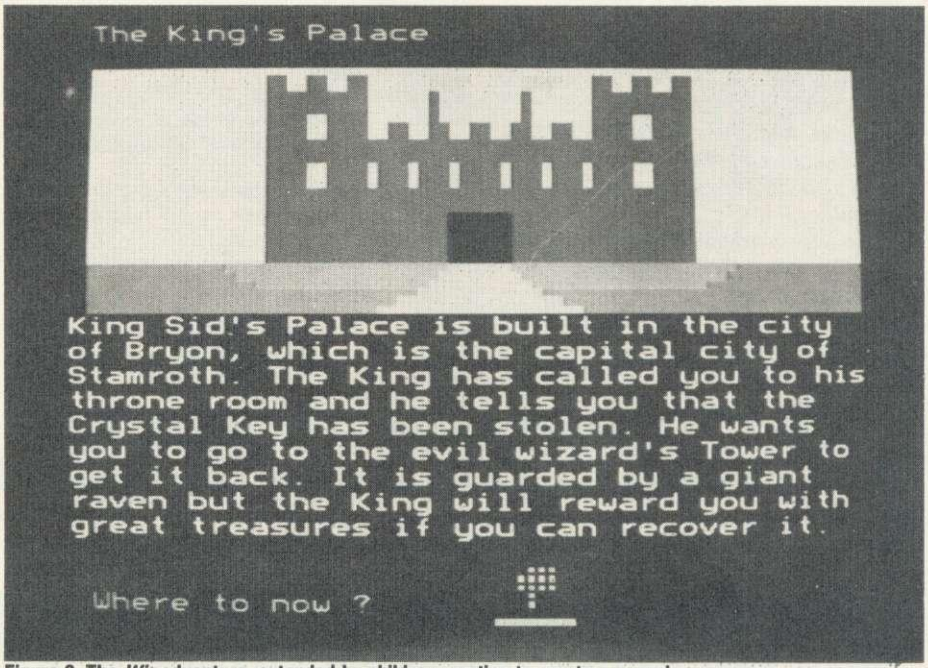


Figure 2. The *Wiz* adventure, extended by children wanting to create a sequel

their own adventures, but what relevance does this type of generator have in secondary schools? Let's first consider the adventure-type computer materials that have been used in this phase of education. *1914* – the World War One simulation – for example, is a package which allows the same type of decision-making as any other adventure. The difference is that its responses to wrong decisions are based on the outcome in reality – in other words, what would have happened is explained in terms of what actually did happen. To sit children down in a secondary classroom and create an adventure based on similar principles to *1914*'s may seem to be a waste of time until you consider the implications of what they are doing. First, in order to create a factual adventure the pupils need to understand the full circumstances of the situation that they are encapsulating. Further to that, they then need to be able to trace a logical progression of events through the timescale of the adventure and to plot the consequences of deviation from that route. The upshot is that full knowledge of every aspect of the situation is gained.

In the same way as the primary sector will need an adventure generator, so, too, will the

secondary sector. *The Last Adventure* and similar titles may be satisfactory for the needs of the pupils but the facilities available will have to be gauged relative to the demands of the scenario. One alternative which provides a sophisticated generation package is *Adventurescape* from ASP. This package allows the creation of a standard format adventure game with routing to different cells or locations by means of cross-referenced pointers. The design allows modification so that this routing may be altered even after the main adventure has been created. Probably the most amazing fact about this package is its price – £6 including the adventure *Amnesia*.

Where in the curriculum would we use this type of facility? English is an obvious starting point. The creation of standard adventures with no other purpose than to achieve first, literary excellence and second, good storylines, covers such a wide range of English language skills that it should be seen as an occasional tool for classes in this area. Humanities also is a logical place to use this type of material. The problem is that in primary schools, where the work tends to be cross-curricular and topic-based, one does not need to worry about subject boundaries. In the secondary sector, however, there are greater problems as one must not step on someone else's patch. In Humanities there is a tendency for work to be slightly more fluid in its subject orientation.

One possibility in Life Skills, Personal Social Development, Religious Education or whatever it happens to be called in your particular school, is the creation of role plays through the medium of adventures. By careful juxtaposition of characters, the different elements of even quite simple situations may be combined and re-combined in a variety of formats to represent the outcomes in different circumstances. The important factor here is the support material and work that goes on around the creation of the adventure itself and its use in its completed form. To give a specific example, the teacher may decide that the topic of stealing should be tackled. The whole gamut of theft, from shop-lifting to grand larceny, could be written into a wide-ranging adventure or just one aspect into a brief role play which takes up only a few 'frames' of text.

The class is asked to explore the character of a shoplifter; the motives, personality, background and relationships with others. The reactions of associated people are then considered and consequences are written into the scenario. Influences for good and evil have to be included and this will cause the pupils to weigh up exactly what is involved in the act of shoplifting, the impact on others, the impact on the individual concerned and all other related implications. This could be done without the computer, so why use it?

The machine provides a focal point at which the pupils may aim their information. It is a medium which will present the results of their thoughts and as such is no different from a wall display or a page in their exercise book. Where it does score is that it is capable of transforming that information and allowing the pupils' work to be brought to life, manipulated and exploited for the maximum value.

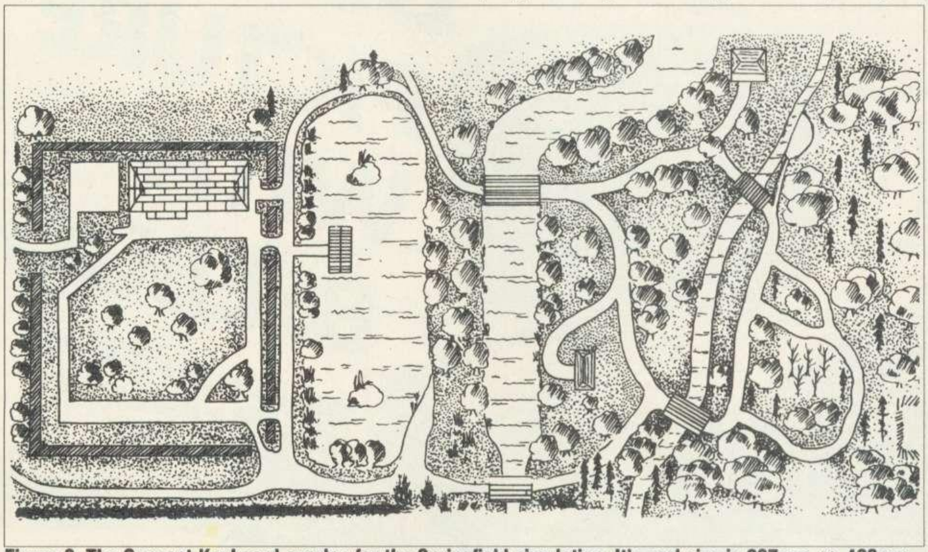


Figure 3. The Concept Keyboard overlay for the Springfield simulation. It's real size is 297mm × 420mm

Mention was made of *Microtext* at the beginning of this article and, as this is the only non-dedicated authoring package to be featured here, you might wonder why it has been left till now.

Microtext could easily be used for creating adventure games. It is possible with this versatile and powerful package to achieve complex routings through situations, assign variables which trigger events under certain circumstances and even provide graphics to the full extent of the micro's capabilities simply by calling screens off disc. *Microtext* will work in any mode although, because of memory, mode 7 is the usual choice.

Microtext was originally designed as a teaching tool for industry but it's now recognised that it could have important uses in education generally. It's ability to process input and react to it in given ways takes it beyond any other package available. If the school already has a copy, teachers who are moderately conversant with the computer could use it relatively easily, but the newcomer would find the job a little more complex.

Supplied with the *Microtext* package comes an example of the material that has been mentioned earlier. You, the user, are in an hotel bedroom. You are woken by the smell of smoke. Do you get dressed, turn over and go to sleep, look out of the door? Dependant upon the choices that you make, you either get out of the burning hotel or are incinerated.

The reason for the lack of star billing for *Microtext* in this article is hidden in the last paragraph: 'if the school already has a copy' – because if it hasn't it will cost a good deal more than packages which will fulfil the purposes outlined in this article at a much lower price. *Microtext* is designed to be a highly sophisticated programming tool without the necessity for programming knowledge. Consequently it doesn't come cheap. It is powerful and pricey but if the school can capture the full benefit of its versatility then its range of applications can become truly enormous.

There are many users already who are dedicated converts, so much so that a *Microtext* Users Club has been formed. No doubt in the future we shall hear of some of the projects undertaken by its members.

PROGRAM DETAILS

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Microtext BBC B, £59.80 disc, £253 ROM
Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411

The Tombs of Arkenstone, BBC B, £17.25 (disc or cassette)
Arnold Wheaton Software, E J Arnold & Son Ltd, Parkside Lane, Dewsbury Road, Leeds LS11 5TD

Your Adventure BBC B disc, £9.95
Learning and Training Systems, Haydon House, Alcester Road, Studley, Warwickshire B80 7AP. Tel: (0386) 792617

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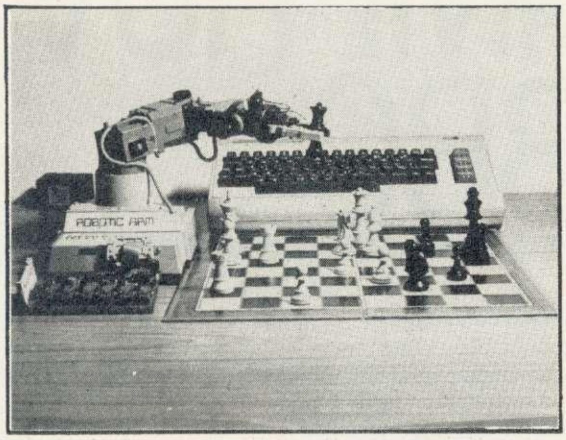
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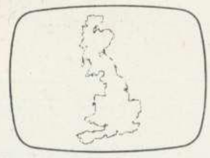
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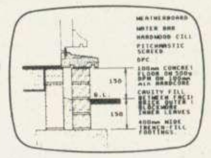
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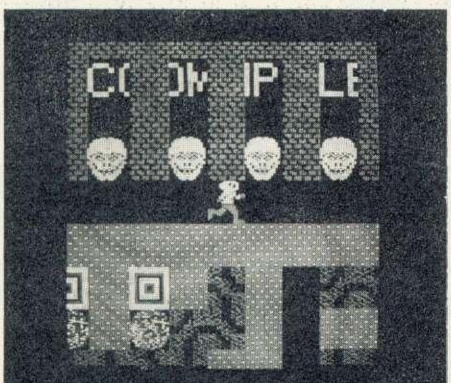
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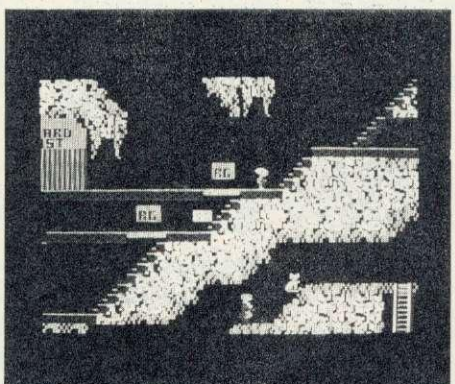
Check out the latest position of your favourite game

TOP 20 BBC MICRO GAMES

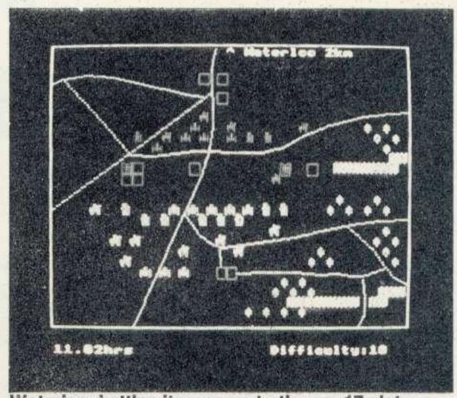
	Title	Publisher	Cassette	Disc	Reviewed
1	(1) Strike Force Harrier	Mirrorsoft	£9.99	£12.99	January '86
2	(–) Way of the Exploding Fist	Melbourne House	£9.95	–	–
3	(–) Repton 2	Superior	£9.95	£11.95	December '85
4	(2) Match Day	Ocean	£9.95	–	January '86
5	(6) Revs	Acornsoft	£14.95	£17.65	July '85
6	(–) Nightshade	Ultimate	£9.95	–	–
7	(11) Computer Hits (10)	Beau Jolly	£9.95	–	–
8	(5) Elite	Acornsoft	£14.95	£17.65	October '84
9	(8) Combat Lynx	Durrell	£8.95	–	September '85
10	(3) Beach-Head	Access/US Gold	£9.95	–	December '85
11	(–) Yie Ar Kung Fu	Imagine	£9.95	£12.95	March '86
12	(7) Monopoly	Leisure Genius	£12.95	£14.95	March '86
13	(9) Jump Jet	Anirog	£9.95	£11.95	January '86
14	(–) Blockbusters	Macsen	£7.95	–	–
15	(20) Scrabble	Leisure Genius	£12.95	£14.95	July '85
16	(4) Bored of the Rings	Silversoft	£9.95	£11.95	March '86
17	(19) Waterloo	Lothlorian	£9.95	£12.95	–
18	(–) Dr Who and the Mines of Terror	Micro Power	£18.95	£19.95	March '86
19	(–) Secret Diary of Adrian Mole	Mosaic	£9.95	£11.95	February '86
20	(14) Alien 8	Ultimate	£9.95	–	February '86



Repton 2: making its debut at no. 3



Dr Who and the Mines of Terror: reviewed on p165



Waterloo: battles its way up to the no. 17 slot

TOP 10 ELECTRON GAMES

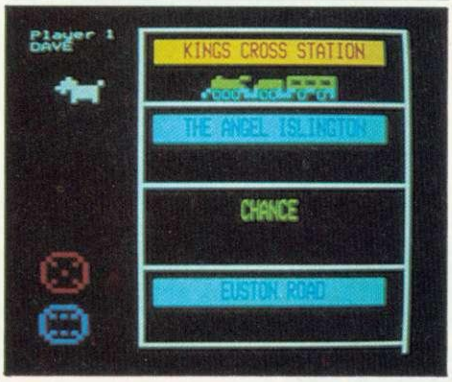
	Title	Publisher	Cassette	Disc	Reviewed
1	(2) Computer Hits (10)	Beau Jolly	£9.95	–	–
2	(1) Beach-Head	Access/US Gold	£9.95	–	December '85
3	(–) Repton 2	Superior	£9.95	£11.95	December '85
4	(–) Chess	Various	–	–	–
5	(5) Star Drifter	Firebird	£3.95	–	–
6	(–) Blockbusters	Macsen	£7.95	–	–
7	(–) Minethe	Micro Power	–	£9.95	–
8	(–) Football Manager	Addictive	£8.95	–	March '85
9	(4) Elite	Acornsoft	£14.95	£17.65	October '84
10	(–) Killer Gorilla	Micro Power	£7.95	–	November '83

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REVIEWS

GAMES

MONOPOLISING THE ACTION



'Monopoly', Leisure Genius, BBC B, £12.95 £14.95 (disc)

If you've played Monopoly with dice on that classic board, you won't need to be told what an engrossing, frustrating and downright evil game it can be. If you haven't, most of this review will be gibberish to you and you may as well pass on to the next one.

The first genuine computer version of the game, published with the blessing of Waddingtons, preserves all the elements of the original. You don't see the whole board at any time – that would be asking too much of the Beeb's graphics – but mode 7 is used cleverly to display four adjoining squares (in their traditional colours), which scroll along as the pieces are moved according to the throw of the dice. You use the function keys for an update on your cash and assets, to buy and sell and take out mortgages, and to remind you of who owns what.

Up to six people can play (although this seems to cause a 'No room' error if all six play for any length of time), and the computer can be invited to join in, playing one or more roles. I can't help wondering *why* six people would want to play *Monopoly* gathered round a micro, when they could play exactly the same game round a board, but I suppose there is something to be learned from the skillful, calculating way the computer plays. And, to be sure, there are some nice additional touches, like the Go To Jail routine: when you land on that fateful square, a police siren accompanies your mournful progress back round the board to Jail (not passing Go, of course), and you're incarcerated to the sound of a heavy cell door clanging shut.

In this good but slightly bug-ridden transferral of the game, there's only one thing I miss from the original: the opportunity to say 'Look! What's that outside the window?' – then when everyone's looking outside, surreptitiously stealing a few thousand from the Bank and transferring a few houses on to my property. Who said cheats never prosper?

Jeffrey Pike

HUMOUR IN THE ROUND

'Bored of the Rings', Silversoft, BBC B, £6.95

There are really three adventures in one here, all linked. On completion of one part you get the password to let you play the next. Mind you, you can cut out the middleman and cheat like I did to find the passwords first.

I'm sure you're aware that this is a spoof on the Hobbit. You are Fordo and you have an assortment of pals with names like Spam and Pimply. You do get a map to give you some sense of direction but it didn't help me at all.

I haven't played the whole thing – it would take the likes of me far too long, but I've had a good wander round each of the sections, getting trapped, lost and/or killed all over the place. I think the big question is whether you like the humour or not. There's a lot of it and it would probably appeal to teenagers, but then, why do I like it? You can use rude words if you're that way inclined. I must point out that I know this not from experience but because I found the dirty words sections in the programs during my search for the passwords.

The programs themselves are written in Basic and are therefore very long, taking quite a while to load. Response times are not as fast as for machine code games but not so slow as to be irritating.

As a bonus, there is an extra program, *Sceptical*, again a spoof, this time on the likes of Ceefax. If you loved the humour in the adventure, you'll love this.

At £6.95 this is excellent value and I can see why it's so popular. Recommended.

Harry Sinclair

BAFFLING THROUGH



'Enthar Seven', Robico Software, BBC B, disc only, £17.95 (40 track, twin disc), £16.95 (80 track, single disc)

Hooray! An adventure on disc. It's great to be able to sit down and start adventuring without the customary 10 minute wait.

Complaints out of the way first. The interpreter is a bit irritating, making you use exact forms of words – for instance 'stick' instead of 'attach' although it recognises both words, and 'turn torch on' instead of 'torch on'. These games are hard enough without the interpreter getting snooty!

There are also some fatal errors. If you try to save your position but the disc you are using has a full catalogue – not difficult if you save your position at different points in the game – the whole thing dies and you are given a 'bad program' message.

Now the game. You're in a spaceship which is itself suffering from a fatal error – it's falling apart. Racing to the escape pod (collecting a few things on the way) you leap in and blast off, as it were. When you come to, you are on a long-deserted space station on Enthar 7. What you have to do is get into the spaceship which is in the car park outside, and head for home. Of course you know it's not that easy. *Enthar 7* is divided into seven (surprise) sectors, each with its own secrets and dangers. My team has been absolute rubbish in all sectors but one, where we've been able to collect a few items. Sadly, we can't find anything to do with them yet. As far as I can tell, there is only one maze, and that isn't difficult.

The descriptions of locations, etc, are read in from disc and everything works smoothly and quickly. It seems odd though that the technique hasn't been extended to include graphics.

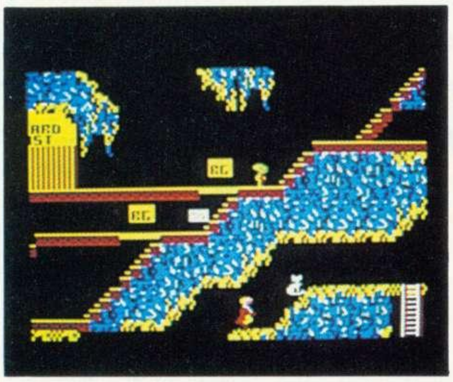
An enjoyable and baffling adventure, and a very good buy – especially when the disc errors get sorted out.

Harry Sinclair

REVIEWS

GAMES

PROBLEMS FOR THE DOCTOR



'Dr Who and the Mines of Terror', Micro Power, BBC B, £18.95 (16k ROM and cassette), £19.95 (16k ROM and disc)

'Ultimate risk scenario,' it says on the box. Which, if it means anything, means that there's a hell of a lot to this game – so much, in fact, that in the Beeb version it comes in the form of a ROM chip as well as disc or cassette. It also says a few other silly things like 'Full cerebral combat status needed at all times,' which presumably means you have to keep your wits about you. So what's new?

What *is* new is that this is the first authorised game built around the BBC's time travelling Doctor (right down to a ropey version of the Radiophonic Workshop's theme tune with the title page), and the scenario is as extensive and as dotty as any TV series. It appears that the Master is planning to dominate the universe again (yawn), this time by building a Time Instant Replay Unit on an obscure planet, using an odd radioactive organic mineral called heatonite, and possibily incorporating the Doctor's brain in his device. All this, and much more, is spelt out in the extensive documentation that comes with the game.

What it comes down to when you're playing with your Beeb is that you direct a Colin Baker sprite around the heatonite mines and the factory, looking for a memory capsule that contains the plans, picking up the usual handy items like explosives, crystals, packing cases and the inevitable stool, and avoiding the nasties, which in this case are headed by a grumpy green lizard thing.

The game loses points for its animation, which is smooth but tiresomely slow and doesn't encourage much athletic running and leaping. Low marks, too, for the use of sound, which is minimal. But it scores highly in the complexity of the problems the Doctor has to solve, and even more highly in the curious assistant he has to help him. This creature, Splinx by name, spends most of her time looking like a white cat, but can be activitated by remote control. This adds a whole new dimension to the game: while the Doc is busy in one part of the mines, the metamorphosing moggie can be active off-screen, tidying up lizard's eggs, or whatever you've instructed her to do. A useful pet to have around.

Jeffery Pike

GET A KICK OUT OF THIS



'Yie Ar Kung-Fu', Imagine Software, BBC B, £9.95

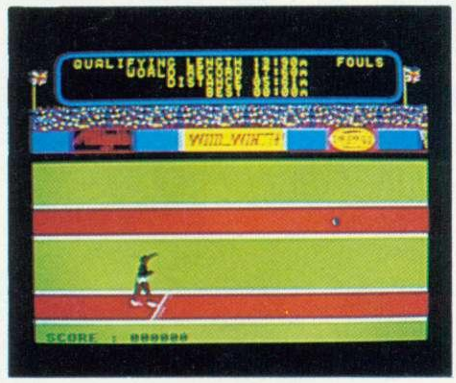
The concept is simple. Our hero Oolong is a versatile little chap who can kick, punch, move left and right, jump and duck. Using these skills, his aim is to become a Grand Master of the martial art, by defeating a series of skilled opponents. You operate him from the keyboard – and it takes the dexterity of a concert pianist to keep him on the move and out of trouble, and to execute the 16 different kicks and punches he's capable of. It all happens at great speed in front of some very attractive Japanese backdrops.

There are no devilish problems to solve. Just a series of genuinely interactive adversaries, all with different skills and weapons (one even attacks Oolong by throwing knives and woks at him). It's great value if you're looking for a fast action-packed game with classy animation (and good sound too).

Only one minor beef: it's useful to pause the game, to get your breath back before the next onslaught – but why use the Delete key to stop the action? It's too close to the keys you're using to leap, duck and kick, and easily brushed by mistake. Let's hope this small irritation can be avoided in later versions.

Jeffery Pike

LOSING THE OLYMPICS



'Olympic Decathlon', Alligata, BBC B and B+, £9.95 (disc)

The Olympic sport of hammering buttons to build up athletes' speed, and slamming joysticks to make them jump or throw, is now available on the BBC B and B+.

My first fear was that the BBC's keyboard would never stand up to the kind of pummelling you'd give an arcade machine. This must, in the long run, be true, but it's helped by the fact that you can nominate keys to represent left foot, right foot and jump/throw.

But unfortunately there are several problems inherent in this software. The energy levels built up by hammering the 'foot' keys are actually irrelevant to the distance which the shot, for example, is thrown; the distance is entirely dependent on the angle at which you release it. On the other hand the javelin's distance is entirely dependent on the energy level; no angle of throw can be chosen.

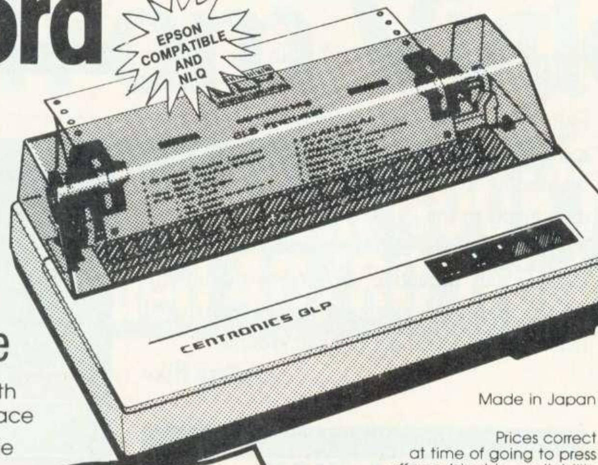
This puts the game way behind its arcade equivalents, which demand that you get both things correct and co-ordinated. In fact, only the hurdles demand a continual level of good reactions in co-ordinating the running and jumping. Without that challenge to the player's reactions, and without a facility to compete against other people, the game can only command a short attention span.

Finally, the choice of the Decathlon theme is a good one in that it offers 10 events – but an absurd one because the final event is the 1500 metres. It gets just a bit tedious hammering the 'foot' keys continuously for nearly four minutes. Mind you, if you get bored, give up and watch the computer's athlete complete 1500 metres in 3:12:36 – that's around 30 seconds inside the world record!

Spend your money in the arcades instead!

Paul Keers

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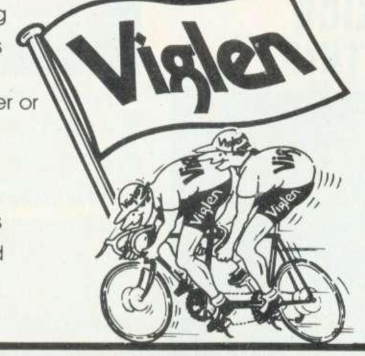
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HARDWARE

LONG-TERM STORAGE

A free-standing easy-to-use module to extend the BBC micro's memory comes under the scrutiny of Simon Williams

The number of options for expanding the BBC micro's memory gets more bewildering each month. There are internal and external cards, boxes and processors, but few can retain stored data when the micro is switched off, and most have to be fitted almost permanently.

The PMS RAM module is free-standing and connects to the 1MHz bus and the auxilliary power outlet of the BBC micro. It supplies an additional 64k of memory using low power CMOS chips which may be configured as a RAM disc or printer buffer. The power supply is used to top-up the unit's battery which, even if left uncharged, will support the chips and hold their data for several years.

The module is supplied in a buff plastic box, measuring about 150 mm × 90 mm. Inside is a single neat circuit board with no noticeable modifications or links. The case is strong enough to be carried around in a pocket or briefcase and as such could be used as a robust, low-capacity disc.

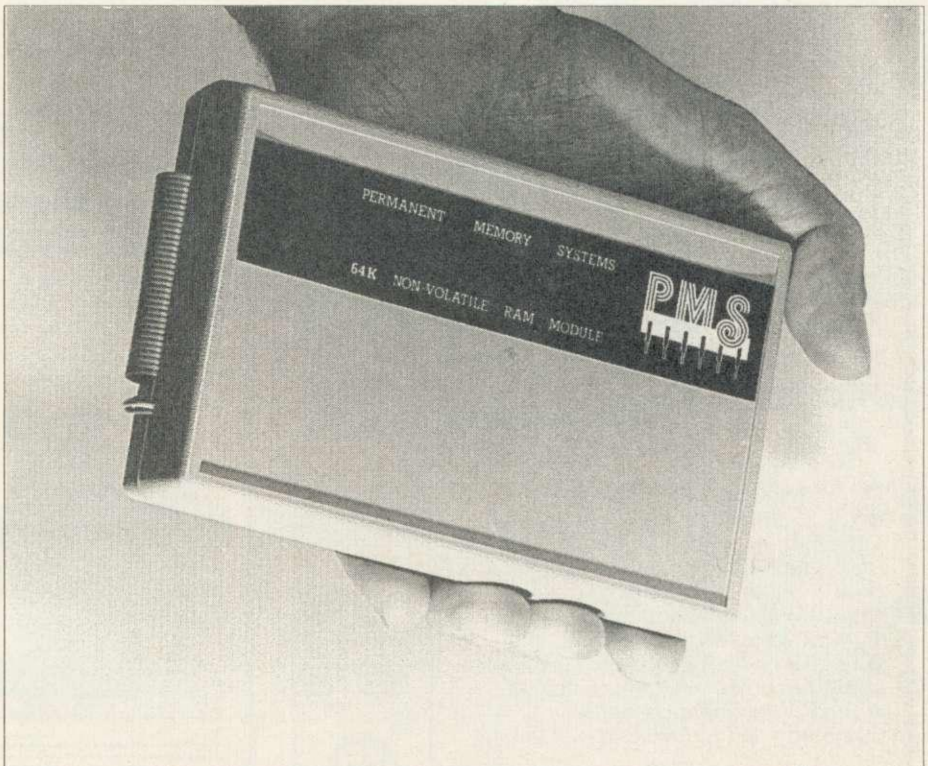
The module works with both the BBC B and B+, and, as it follows Acorn's guidelines, should work with most configurations of machine. It comes with software on tape or disc, but once this is loaded into the module itself, it will happily run without other means of storage.

Before using the module, the memory chips and battery backup can be tested by the routines supplied. You're advised to switch the power off for at least five minutes to check the battery supply.

The two main applications for the module, as a RAM disc and as a printer buffer, are catered for with ready-made routines. One or other is loaded from disc, and a call is then made to start up the module in whichever mode is selected.

Changing modes is simply a matter of backing up the module to tape or disc, clearing it and loading the other software.

The RAM operating system (ROS), which takes up about 4k of the module's memory, controls the RAM disc and mimics Acorn's disc filing system. There are commands to load, save and catalogue files, to lock and delete them, to compact the RAM and even to build a !BOOT file. The system distinguishes between capitals and lower case letters in filenames (which may be as long as you like, although only the first 15 characters are significant).



PMS 64k RAM module: provides battery back-up or long-term storage for a cassette-based micro

Deleting a RAM file only marks it as deleted, so the file may be reactivated, as long as other data hasn't been recorded over it and the RAM hasn't been compacted.

The ROS will work with Basic, other languages, and wordprocessors such as *Wordwise* and *View*, although only as a RAM disc. The memory can't be configured as shadow RAM to allow a true program or text buffer to be used.

The printer buffer software only takes up 1k, leaving a massive 63k for text. I used it to print out this review while I carried on writing – in fact the module could have handled a file 20 times the length. The buffer can be switched off with a *FX call, and enabled again with the same call as the ROS uses.

As well as these two main programs, another gives an impressive demonstration of windows. A number of utilities are supplied, chief among these being routines to transfer files from disc and tape to RAM, and to move RAM images to and from disc. It's also possible to access the module directly from Basic or machine code and details of recommended methods are given in the manual.

The module performs well and is a very convenient way of extending the BBC micro's memory. It does not really replace sideways RAM cards which fit inside the micro's case, as its main function is as a RAM disc. It's worth considering though if battery back-up is important or you are thinking of adding a small amount of long-term storage to a cassette-based micro.

The price of CMOS memory chips is no longer the extreme drawback it used to be, and I do feel the unit is overpriced, particularly for individual users.

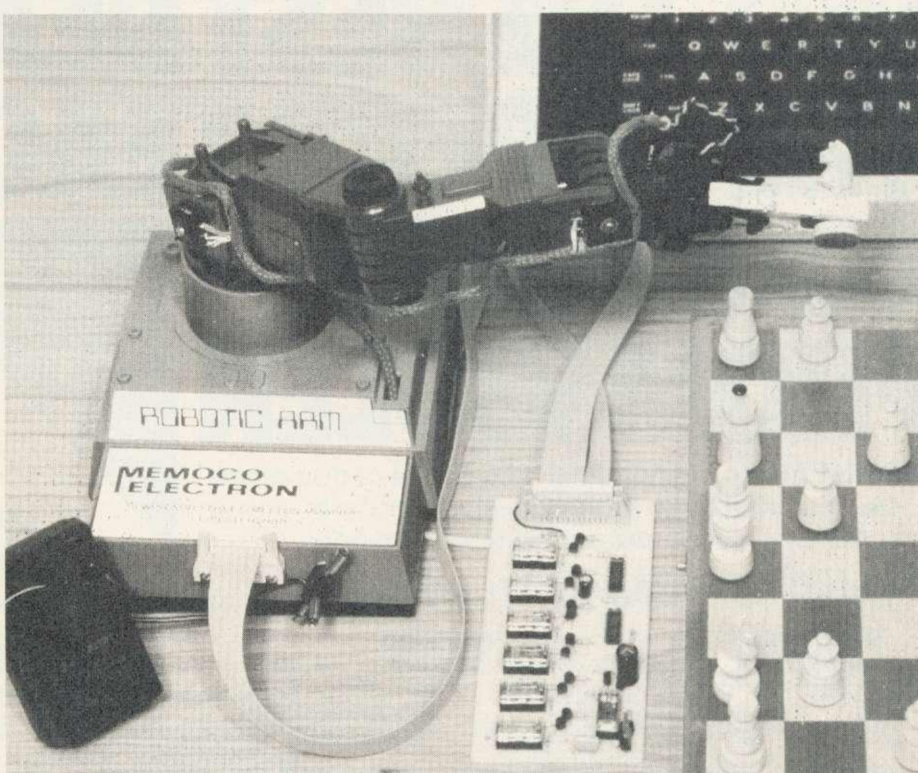
In its defence, though, PMS intends to sell primarily to industry and education, where robustness and ease of use may well be the governing factors.

64k non-volatile RAM module £151.75
Permanent Memory Systems, 38 Mount Cameron Drive North, East Kilbride G74 2ES. Tel: (03552) 32796

HARDWARE

ARMED FOR ACTION

Richard Sargent flexes the muscles of the Memoco Robotic Arm and puts it through its weightlifting paces



Memoco Robotic Arm: 'as an introduction to serious robotics for home and school use, it has a lot in its favour'

Robotic arms are fascinating devices, and the one from the Melton Mowbray firm of Memoco Electron is doubly so since it is a conversion of a Japanese model arm, 'Robo 1', manufactured by the giant mechanical-toy makers Tomy.

The modified arm has five axes and a two-fingered claw, and offers by far the greatest number of degrees-of-freedom of any arm in this price bracket. The waist rotates through 270 degrees. The shoulder has less angular movement, but what it has is sufficient to raise the extremity of the arm about 25cm above base level. The elbow joint moves right/left, as opposed to the more conventional up/down, and has 180 degrees of movement. The wrist is double-jointed, and achieves an up/down movement of 180 degrees and a rotation of 270 degrees. The claw has a smooth, uniform open/close movement and can hold objects up to 4cm wide. The lifting capacity is about 45g, the weight of a PP3 battery. The construction is solid, and the joints have remarkably little slack in them.

I particularly like the range of movement in the wrist: you can, for example, program the arm to pick up and replace light objects. The wrist-swivel action can perform tasks such as turning burette-taps or control-knobs, providing they are not too stiff.

There is an art to controlling this arm: you have to make allowance for the poor torque of the elbow and wrist joint when they are in certain positions. Let the main limb (powered by the shoulder axis motor) do all the heavy lifting! The reach of the arm is limited, being about 25cm from its dead-centre, so you won't be able to use it to play chess with a standard size board. Don't expect it to lift heavy weights, either. The arm is not counter-balanced, although it would be easy enough to add a small platform as a rear extension to the arm to hold some counterweights, if you wished to.

Tomy never intended that the arm should be linked to a computer but without that factor, the arm has only limited appeal. Memoco's conversion scraps the joysticks, mechanical gearing and single (noisy) motor of the Tomy arm and replaces them with six motors, five potentiometers, a pressure pad, and a rather neat umbilical cable. This is the basic Memoco arm, which sells for £129.95 inclusive. From this point on you can either build your own computer interface, or buy Memoco's ready-made interface at £49. You might wish to by-pass the custom-built card if you want to drive the axes simultaneously, or if you already have a suitable interface. The uncased Memoco board is well built and uses good quality IDC connectors on ribbon cable to link with the robot and with the BBC micro. The motors have their own 6V power supply, derived from a small commercial DC power pack.

The arm at work

There are two tests for any arm robot. The first is positioning accuracy. With a claw which opens to 4cm, I consider that if the arm travels to within 1cm of its target, it's probably accurate enough both as a teaching aid and as a hobby component. The Memoco arm achieves this. The second test is consistency. The Memoco arm passes this test too, with the axis-potentiometers keeping accurate track of the position of all the joints, enabling repetitive work to be carried out successfully. The speed of the motors can be set, and anyone who has seen the original Robo 1 move at breakneck speed will surely be impressed by the slow-motion of pulse-width-modulation which the Memoco software provides.

The program "KEYS" moves the arms under keyboard control. This program takes the robot through a series of actions, registering the potentiometer settings printed on the screen for the various positions that the arm takes up. These settings can be regarded as co-ordinates which will later enable the arm to perform a number of preset tasks. At this point you have to devise your own 'teach and repeat' program, using subroutines and segments from the listings supplied. The present handbook is, by intention, really no more than a leaflet, but the code is reasonably clear Basic and users of the Beeb should be able to follow what's going on. (If you know the equivalents of Poke and Adval in Logo or Forth, then you will have little trouble writing some robotic control software.)

This arm is versatile enough to make it useful in any application where it doesn't have to lift heavy weights or run all day long. As an introduction to serious robotics for home and school use, it has a lot in its favour.

Memoco Robotic Arm, Memoco Electron, £129.95; BBC B Interface Card, £49

OLD MASTERS WITH A MOUSE



'AMX Super Art', Advanced Memory Systems, £49.95

This AMX Mouse certainly is a fast breeder, perhaps it should be renamed the rabbit! First there was *AMX Art,* a simple but effective introduction to the AMX Mouse. The program offered some unusual features, the most popular, I would guess, being the wide range of pattern fills.

Then along came *AMX Art Plus.* An improved version of *AMX Art,* it also offered users the chance to design their own fill patterns, to draw pixel by pixel, and to copy and rotate sections of their masterpieces.

Both *AMX Art* and *AMX Art Plus* ran in mode 4, offered only two colours and the drawing area was limited to a central window. Now, in the form of a new ROM, disc software and supporting documentation, AMX has come up with *Super Art.* Enthusiastic Mouse owners can be forgiven for feeling that they are in danger of being overrun! So just how super is *Super Art*?

The addition of colour for all aspects of drawing is the most obvious development from earlier programs. *Super Art* runs in mode 1 and thus enables drawings to be created using up to four colours.

The other major departure is that drawings are no longer restricted in size to the central drawing window. A 'scroll screen' option permits you to scroll parts of a larger picture in and out of the drawing window. *Super Art* pictures can even cover areas bigger than the conventional screen so that A4-size dumps can be printed out.

Once running, the program is for the most part easy to use and maintains the high standards set by earlier AMX software. Drawing is simple – circles, lines, airbrush, loading and saving are chosen and executed from on screen menus using the cursor or 'pointer'. Although written for use with the AMX Mouse you don't need one to use the program. The pointer can also be controlled using either keyboard or joystick.

Super Art incorporates in improved form most of the features available on earlier packages. For example you can draw squares, circles, ellipses, and fill areas with solid colour or a wide range of patterns.

The airbrush option allows you a choice of line thicknesses and effects. Text can be positioned anywhere on screen in a choice of typefaces. Selected areas can be copied from one part of the screen to another or mirrored and rotated.

A zoom option enables sections of the screen to be enlarged and edited while the drawing remains on screen. In a similar fashion, fill patterns can be edited directly with your picture on screeen. The cut, copy and paste options allow you to save selected parts of the screen which can then be loaded back and repositioned. Some options such as zoom and fill are loaded in from disc when selected. All these features can be used from within the one program, a great advance on earlier AMX art software.

Sophisticated

Super Art is undoubtedly a sophisticated and ambitious program, and the expanded range of options offered is very welcome. The program is not as simple to use as previous AMX art programs, however, and I feel for some users this may offset the value of some of the program's extra features.

A major difference from earlier AMX art software is that *Super Art* stores pictures not as screens as previously but as data files. To save your work a blank 'picture file' needs to be prepared in advance.

Creating picture files and the subsequent loading and saving of pictures is decidedly time consuming. The scroll screen feature similarly works rather slowly.

The time taken to reposition the drawing area is a drawback – all the more so since not only is this not an easy feature to master but also because the user guide is not very helpful in this respect.

Preparing a picture file is relatively easy but again the user guide is not as clear as it might be and I found choosing the picture size from the screen menu confusing at first. Overall I was not too happy with this aspect of the *Super Art* program.

One of the attractions of using a computer to draw pictures is the speed with which you can both get started and then save, load, and reload the results. *Super Art* does not offer this and I can see this being an obstacle for beginners or those using the program with younger children.

On display

Once drawn, pictures can be displayed independently and with a bit of tinkering saved as standard screens. Existing *Super Art* pictures may also be converted for use in earlier AMX programs. However, I think the program should also have included a routine to convert existing mode 1 screens into picture files for use in *Super Art.* I was most disappointed to find that I could not load my old screens into *Super Art.*

A further variation from earlier programs concerns the *Super Art* disc supplied. This cannot be used directly. To make full use of the range of routines supplied, a separate 'drawing disc' has to be prepared. This process presented no problems and was clearly explained in the manual. The 'drawing disc' can also be used to store picture files so only one disc is needed when using the program.

As you can appreciate, setting up and preparing the library disc and picture files requires patience and a careful reading of the user guide. This may well present some initial problems for less experienced users.

Reservations apart, however, there is no denying the excellent range of attractive features offered by *Super Art.* The pattern fill, icon designer and cut and paste options are all a pleasure to use and open up all sorts of possibilities for screen design. As Mouse users already know, AMX has a proven record in providing support for its products. An advanced user guide is already being planned and future software is envisaged. No doubt many extra features will be implemented to extend the range of features offered.

As with the earlier *AMX Art* ROM, the *Super Art* ROM offers a range of system commands and both the disc and user guide provide routines and sample programs to illustrate how these can be incorporated into the user's own programs.

Super Art is a welcome addition to an already impressive range of mouse-based software. The price may deter some, as may the question of loading and saving, but overall the attractions of *Super Art* are hard to resist.

Jonathan Inglis

SOFTWARE

PROBLEM SOLVING WITH MICROPROLOG

Joe Telford reviews a language offering a new way of programming and thinking



The 16k Acornsoft MicroProlog ROM can be fitted just like any other chip. On typing *ROMS (on a B+) it informs the user that it is version 3.1 and has language and service entries, and that's about all that can be done without referring to the documentation because making the system do anything simple is difficult. Three sheets of documentation are included: a useful 'how to insert ROMs' sheet; an indispensable 'how to copy the dual format disc' sheet; and 'getting started with MicroProlog' instructions.

On first studying the getting started sheet, you'll find it indicates that the chip also includes a large amount of extra memory, but sadly this is not the case – on my BBC B a mere 23k was available in mode 7.

The getting started sheet makes the whole package look quite easy. Just stick in the utilities disc, type:

LOAD "COPRIME"

then you're off. Type:

?((factor 15))

and the COPRIME program will not only find the factors of 15 but also update its database of primes (listing 1).

The manual is not a teaching book and the novice Prologer should buy a supportive text too – a reasonable one is *Start Problem solving with Prolog* by Tom Conlon, published by Addison-Wesley. This covers a small amount of the facilities available in MicroProlog, but will act as a springboard to further learning.

The manual begins with an introduction to MicroProlog, what it is and what the user needs to know to drive the system, then goes on to discuss programming in pure Prolog. Chapter three explains the MicroProlog supervisor, which is heavy going for novices, and is followed by an explanation of utility modules, which are an important means for changing the MicroProlog environment, and advanced programmers will need to know how to create and edit modules which extend the Prolog supervisor.

The next section on the SIMPLE front end to Prolog is more relevant to beginners and uses English sentences to form the clauses and rules of a Prolog program. Another front end extension is called MICRO and will work with SIMPLE files, and provides a bridge into MicroProlog proper.

The built-in functions of MicroProlog covered in chapter seven, are quite comprehensive (figure 1). MITSI is yet another extension to the supervisor, but more straightforward to drive than SIMPLE. This is the currently recommended front end for use with MicroProlog in secondary education.

Finally, the manual has six appendices, which are quite important, and cover: entering MicroProlog; keyboard control and line editor; special primitives; file naming conven-

Keyword and parameters	Action
(SUM x y z)	x+y=z
(TIMES x y z)	x*y=z
(LESS x y)	x<y
(INT x y)	x takes y as its integer value
(LESS string1 string2)	string1 < string2
(STRINGOF list constant)	convert constant to list or pack list to constant
(CHAROF x y)	x is a character with ASCII code y
(R x)	Read next term from keyboard
(P t1 t2 . . tk)	Print terms t1 . . . tk
(PP t1 t2 . . tk)	special format printing
(RFILL (t1 t2 . . tk) x)	invoke line editor using t1 . . tk
(OPEN fname)	Basic OPENIN
(CREATE fname)	Basic OPENOUT
(CLOSE fname)	Basic CLOSE
(READ fname x)	read x from file
(WRITE fname (t1 . . tk))	write list to file
(W fname (t1 . . tk)	similar to Basic SPOOL
(IOB fname x)	Basic GET/PUT BYTE
(NUM x)	is x a number?
(INT x)	is x an integer?
(CON x)	is x a constant?
(LST x)	is x a list?
(SYS t)	is t a primitive? (eg, LST/CON, etc)
(VAR x)	is x a variable?
(DEF t)	is t a call to a defined program?
(NOT relation t1 . . tk) (A)	complex conditional Not
(IF a b c)	complex IF construction
(EQ t1 t2)	is t1 = t2?
(? X)	true if all X is true
(FORALL a b)	for all the solutions of list a list b can be solved
(! relation t1 . . tk)	the first solution to relation t1 . . tk
(CL x y z)	defines a clause
(ADDCL x)	adds x as the new last clause for its relation
(DELCL X)	deletes the first clause matching X

Figure 1. Typical built-in functions of MicroProlog

tions; error messages and pragmatic considerations.

The contents of the utility disc are split into a number of parts. First are the languages – Prolog is a version for sideways RAM and Hilog makes use of the extra memory provided by the 6502 second processor. The idea of providing ROM images on disc in this way is most commendable, as is including the Hi-version in the price.

MICRO, MITSI and SIMPLE are modules which provide various levels of sophistication for novice users. As with all the modules they are used by typing LOAD <modulename> from Prolog.

The modules TRACE, SPYTRAC, EDITOR, EXREL, MODULES and LOGIC are explained in chapter four of the manual.

TRACE allows interactive selective tracing of the execution of a query. As with all the modules their file names only partly reflect their module names. So LOAD TRACE gets the tracemodule into memory, but KILL tracemod is required to delete it.

SPYTRAC houses 'spytrace-mod', a module which gives entry and exit information for all calls on a specific user-defined relation.

The 'editor-mod' module is designed to allow editing of information in MicroProlog. It becomes important to learn how to drive 'editor-mod' as almost any advanced work relies on it.

MODULES is a file containing 'wrap' and 'unwrap' which parcel up and unparcel modules. Only unwrapped modules can be edited:

unwrap <module name>

places the named module in workspace and it can then be edited.

The 'exrel-mod' is useful when memory is at a premium. Surprisingly, this can be a common occurrence particularly for programmers new to Prolog. For example, the command:

external <fname> <relationl .. relationk>

places the relations listed into a named file on disc. They are still accessed in this file, but the action is slower than by direct memory access.

The 'logic-mod' module has a single logical operator called ISALL, which can produce a list of all relations solving a particular query.

Another set of modules: EXPTRAN, SIMTRAC, DEFTRAP, TOLD and PROGRAM are found in chapter five, which also discusses the SIMPLE extension to Prolog.

SIMPLE provides a number of easy-to-use tools for the new Prolog user. It includes modules to make queries, to add, delete and edit sentences. In order to make more space available, one of its constituent modules, 'program-mod', can be erased with the KILL command. If further amendment to the program is required, then the module 'program-mod' can be loaded by itself using LOAD PROGRAM. EXPTRAN holds the 'exptran-mod' module, which can allow the use of expressions in sentences.

```
LIST ALL
((factor X)
  (coprime X)
  (PP X is a factor))
((factor X)
  (PP Testing for factors of X)
  (IF (? ((fact X Y) (factor Y))) ((PP X can be factorised)) ((ADDCL (
(coprime X)) 0) (PP No factors of X found ... it might be prime !) (PP
 Adding X to database of coprimes))))
((fact X Y)
  (coprime Z)
  (TIMES Y Z X)
  (INT Y x)
  (EQ Y x)
  (PP Z is a factor))
((coprime 5))
((coprime 2))
((coprime 3))
&.
.
.
?((factor 15))
Testing for factors of 15
5 is a factor
3 is a factor
15 can be factorised
&.
```

Listing 1. COPRIME program and a sample run

The 'told-mod' defines the relation 'is-told' which allows programs to become interactive. As they run they can ask questions of the user.

DEFTRAP is an error handling module. SIMTRACE is a simple version of the TRACE module discussed earlier.

MICRO is another front end for Prolog, and it provides the link from SIMPLE to the standard Prolog supervisor. Programs written in SIMPLE can run under MICRO but clauses entered in MICRO are actually standard Prolog syntax.

In switching from SIMPLE to MICRO, or vice versa, it's vital to KILL all modules before LOADING the new extension.

MITSI provides the simplest environment for driving MicroProlog. Once MITSI is loaded, the prompt changes from &. to >>> and FACTS can be entered. A fact is a sentence which has the form 'thing relates-to thing' so:

We luv Kitty

4 sum-of (2 2)

(Bruce Smith) bites (Re-users)

are all facts. To add a fact to the program simply type it with a full stop at the end, eg:

>>>Fernando likes Kitty.

>>>Kitty likes Fernando.

are facts added to the program. We can also add rules in the same way:

somebody luvs someone if

somebody likes someone and

someone likes somebody

Notice that the rule is a set of facts connected by 'if' and 'and'. Note also that in MITSI words beginning some . . . are regarded as variables, and so can be used in rules.

Commands can be given in MITSI by typing lines ending in a !, for example:

>>>list likes!

likes:

1. Kitty likes Fernando

2. Fernando likes Kitty

Asking questions is equally simple, just add a question mark, eg:

>>>Kitty likes Fernando?

YES

and

Fernando likes someone?

YES Fernando likes Kitty

No (more) answers

If we wish we can ask quite complex questions, for example:

>>>Kitty luvs Fernando?

YES

>>>why?

Kitty luvs Fernando because

Kitty likes Fernando and

Fernando likes Kitty

Conclusion

Should you spend your hard-earned cash on this program? On the negative side, the package is more expensive than the regular run-of-the-mill language package, and there is little tutorial material included. Countering that is a feeling that here is a complete, professionally produced language which offers a new way of looking at both programming and thinking.

This will appeal to the language specialist in the hobby market, but it should definitely be used, or at least explored, by educationalists with students in the later years of secondary school, further and higher education.

MicroProlog, Acornsoft, £79.95

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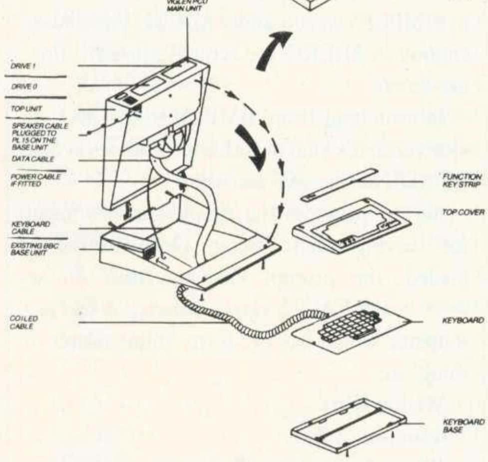
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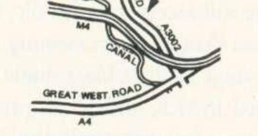
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REVIEWS

BOOKS

SOUNDING OUT THE BEEB



'Creative Sound on the BBC Microcomputer Model B', David Ellis and Chris Jordan, Acornsoft, £9.95 (discs included)
'Mastering Music' S&A Gibbs, £6.95
'Using Sound and Speech on the BBC Microcomputer', Martin Phillips, Macmillan, £6.95

Here are three books which, despite the apparent similarity of their titles, manage to traverse the musical jungle in completely different ways. Each appears to have been written with a particular kind of aspiring 'musician' in mind, mainly with uninspiring results.

Using Sound and Speech on the BBC Microcomputer, by Martin Phillips, appears to have been largely transcribed from existing documentation, and therefore suffers the same kind of sparseness as John Coll's original User Guide. Phillips plunges straight in with a short synthesiser program (in Basic) which reminded me of a Telesoftware synthesizer (from a few years ago). This strikes me as a rather unusual approach, since the following chapter is entitled 'Understanding sound', but I suppose that the uninitiated reader might well be delighted with such a 'pop-up' toy.

Oscilloscope images and particle diagrams introduce the basis of sound as vibrations in air, and a couple of programs produce illustrations on the screen to reinforce this idea. We are then launched into a detailed description of the SOUND statement, taking 16 pages, which covers all of its various options with some help from short examples.

The ENVELOPE statement is given similar treatment, this time with the now familiar set of diagrams showing amplitude versus time. All good stuff, but a rather slow start for anyone but the absolute beginner.

The discussion of the speech system is the best feature of this book, with several diagrams and a good explanation of the principles behind the Beeb's synthesis circuitry. There are a number of example programs demonstrating the use of compound words, culminating in a program which 'intelligently' speaks large numbers using the appropriate words rather than by just listing the digits. It is rare to find a sound book with such coverage of the speech system, and this section certainly enhances its usefulness as a reference work.

The back of the book contains charts and listings which should allow adept readers to create all the noises they could ever wish for, and there is also an excellent summary of the operation of the sound amplifier hardware.

It's a rather odd combination of the simplistic and the highly technical, but overall a good summary of the facilities and techniques.

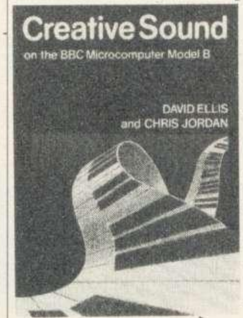
Mastering Music attempts to serve two masters by covering simple music theory and BBC micro sound commands concurrently. This could be a useful approach for people with no prior knowledge of either, but I found it rather irritating (having a little knowledge of both). The book concentrates on the process of transcribing and arranging a piece of musical score for reproduction on the BBC micro; if there was an award for the most retrograde step in musical history this would, in my opinion, be a top contender! This approach is made worse by the fact that the climax of these 140 hybrid pages is a rendition of the *Ride of the Valkyries* on four sound channels. Entertainment it is, but hardly the stuff that music is made of.



The overall information content of this book is low and my recommendation is to leave this one on the shelf.

Creative Sound is, at 320 pages, the thickest of the three, and it comes bundled with a disc full of software to support the text (the book is also available separately).

The authors, David Ellis (seen in *Making the most of your Micro*) and Chris Jordan (designer of SOUND, ENVELOPE and the Music 500 synthesiser) have teamed-up to great effect, writing the text and software respectively. The book is more like a travelogue through the world of sound than a tutorial for the BBC micro, and is a fascinating and highly entertaining read. Ellis' chatty prose covers the principles of sound, synthesising hardware and techniques, musical notations, sound effects, playback and composition systems, and computers in music teaching. There are a formidable number of programs, most of them self-documenting and all beautifully presented, making up two discs supplied in the package. The combination not only saves typing time, but makes an attractive package for anyone interested in musical applications of micros.



This is not a concise book, and its lack of an index makes it essentially useless as a reference work. But I would not assume that the authors had either of these goals in mind. Whatever their intention, the result is a work which should be a central part of every musically inclined BBC micro owner's library.

Alex van Someren

EDUCATING PROGRAMS

'Writing Educational Programs', by Dave Carlos and Tim Harrison, Papermac, £8.95

Early attempts at this sort of book failed dismally since the authors knew no more than anyone else and were merely telling the reading public how to write programs, without any real reference to why they were being written. The philosophy had not been worked out and no-one could honestly say why the computer was being used.

Messrs Carlos and Harrison have made a good attempt at putting over their viewpoint and their approach is to be praised because they do not provide us with a suite of programs to be typed in. What they do is to lead the reader by the hand through the guiding principles of what makes good practice and they then attempt to exemplify it in excerpts from the two or three programs that provide the substance of the book.

If you don't like programming then this book is not for you. If you think that you might like it but have not yet dipped your feet in the water, then you will find this probably one of the best books to put you on the right track. The authors' style is clear, their approach is workmanlike and sensible in that they explain every step as they take it and the overall impression is of a thorough and useful reader in educational computing.

This pick-up-and-carry-away approach to programming, especially with BBC Basic's procedures can produce interesting results.

Nick Evans

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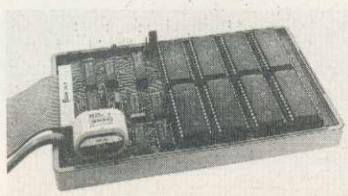


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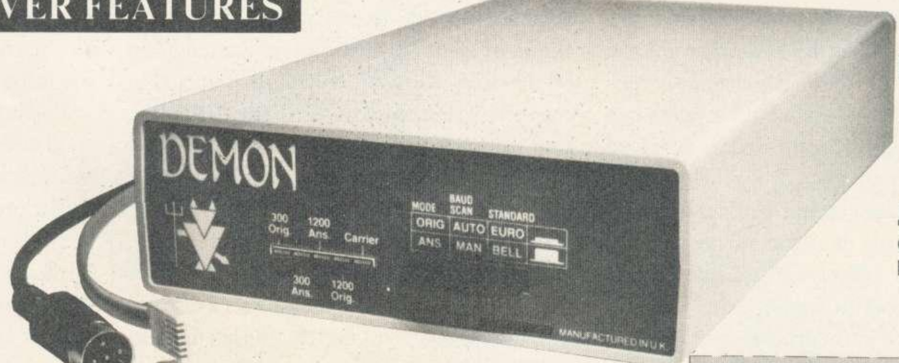
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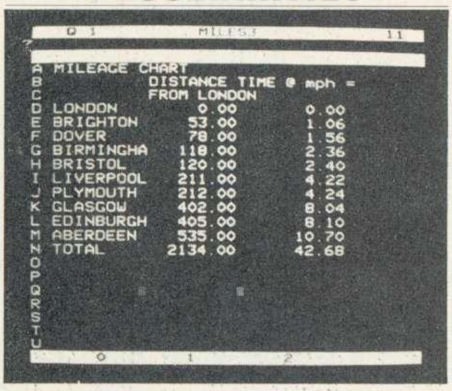
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REVIEWS

SOFTWARE

SPREADSHEET WITH PECULIARITIES



'PractiCalc II', Practicorp, BBC B and B+, with 6502 second processor Econet and some shadow RAM boards, £69.95 (inc. VAT). Converted to the BBC micro by Cambridge Microsystems, Goddard Road, Whitehouse Industrial Estate, Ipswich, Suffolk IP1 5NP. Tel: (0473) 462721

This is a strange spreadsheet package with some very good features and a few bad ones. To begin with it originates from the USA where it was written for the Apple II series of computers and those that were compatible with them. There are also versions for the Commodore 64 and Laser 3000 computers. This version has been converted for the BBC micro by Cambridge Microsystems, and they seem to have done a good job of it.

It is inevitable that a package written for another system will present some problems, and not the least of these is the much smaller memory of the standard Beeb.

With the greater memory of the B+ and second processor systems the capabilities come into their own, and are more extensive than those of any other spreadsheet I have come across for the BBC micro.

At first I almost gave up trying to get it to work because of the confusion between the very detailed Operating Guide which is written exclusively for the Apple and the Supplement which covers the different systems. With 38 commands to consider, few of which come in the form of the letters you'd expect, and all of the screen prompts shown in the American Apple style, I was despairing of ever managing a simple example of multiplication.

Once I learned the knack of relating the prompt to the keystrip to the Operating Guide and then to the Supplement, my opinion of the package grew rapidly. I was impressed with some of the unusual features – above all the ability to sort columns or rows alphabetically or numerically, a feature I have not seen on any of the popular basic spreadsheets. It also has the useful 'Net Present Value' and 'Lookup' facility which I liked in *Ultracalc 2* and an unusual method of optimisation in 'what if?' type situations.

There is a simple but effective way of producing basic bar charts.

The method of producing long titles was good, but the problems of getting variable width columns at the same time was something I never really solved. It also claims to be able to load *VisiCalc* files.

It seemed as though more keystrokes were needed for most actions than with the five other spreadsheets I have used.

Loading and saving sheets was as easy as any, but the arithmetical operations, and above all the most essential activity – replication – was a much more tedious business because it seems you must first indicate which activity, then the addresses, and finally the instruction to carry it out: thus, to multiply you use (f0), then the boxes to use (A15*B16) and finally (f4) to calculate.

Now that I am accustomed to a ROM-based system I need to be convinced that a disc system is a good idea; as I use a BBC micro with no extra memory I cannot use *PractiCalc II* in 80-column mode but am limited to 40-columns in mode 7. I would find this unsatisfactory as a regular practice, but those who use a normal TV receiver as a monitor might not mind the restriction.

> This information will help you to compare *PractiCalc II* with the spreadsheets reviewed in the February and May 1985 issues. Marks are out of 10.
>
> **Size of matrix** 8; **Labelling** 9; **Making entries** 5; **Replication** 5; **Commercial uses** 7; **Scientific uses** 7; **Statistical uses** 7; **Display** 8; **Graphics** 4; **Printing** 7; **Wordprocessing linkages** 0; **Speed** 5; **Ease of use** 4; **Documentation** 4; **Overall value** 5. **Comments**: Worth thinking about if you have patience, a micro with an extended memory and want a disc-based spreadsheet.

Printing was no great problem and the commands seemed straightforward, although I only tested it with a daisywheel printer. More serious is the absence of a convenient link with a wordprocessor, although the capabilities included a simple text editor which is rather optimistically referred to as a 'wordprocessor'.

Overall it is a useful package and surprisingly versatile if you are prepared to devote considerable effort to learning its peculiarities. I doubt if a busy business user would want to bother and would probably prefer a ROM-based system with 80-column capability. On the other hand an enthusiast with a second processor and heavily loaded ROM board wanting a good spreadsheet for occasional use could find it very suitable. It would be much better if the programs and the manuals were re-written with the BBC micro exclusively in mind.

Roger Carus

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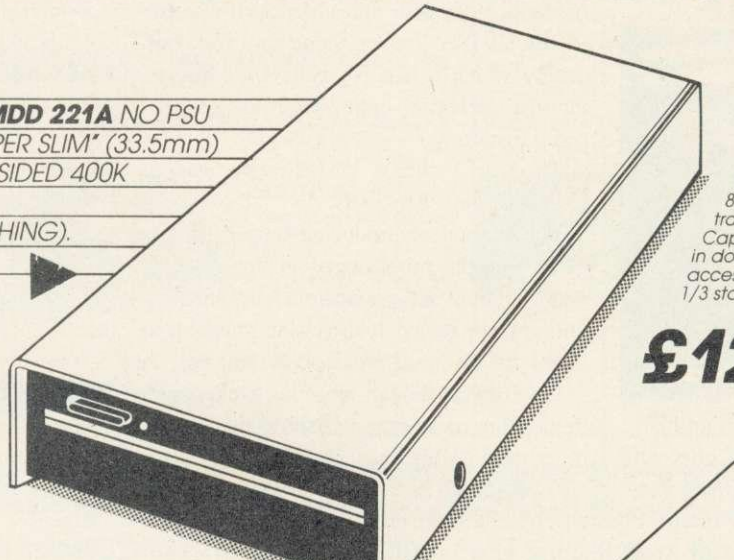
Imagine then the concert hall that is the front room of his house. The young virtuoso takes the stage and, pressing the button on his tape recorder, plays the music he has learned to the accompaniment of orchestra and rock group – in reality clever use of synthesisers.

As he progresses through this course of materials even the drabbest exercise is enlivened first by the patience of the computer and second by the motivation brought about by the wonderful accompaniments that transform tedious finger and beat exercises into exciting experiences for the young musician.

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Nick Evans

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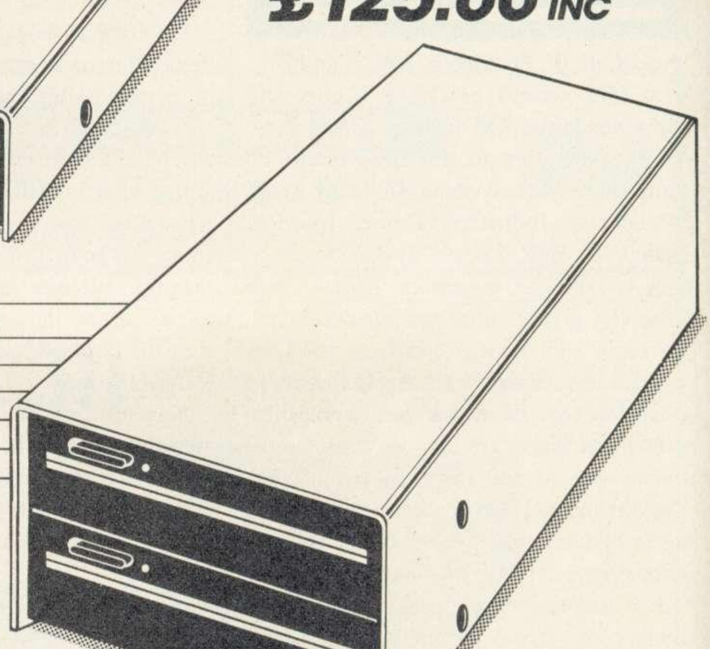
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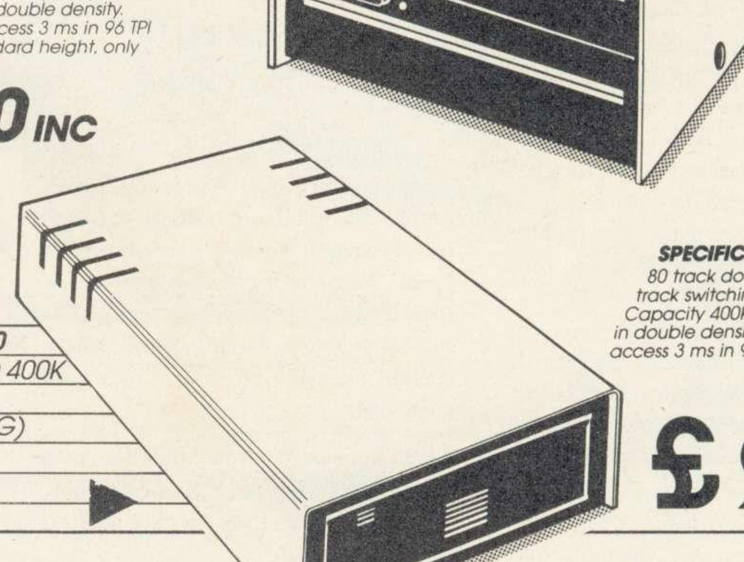
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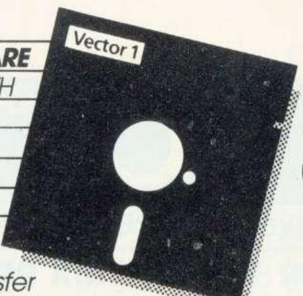
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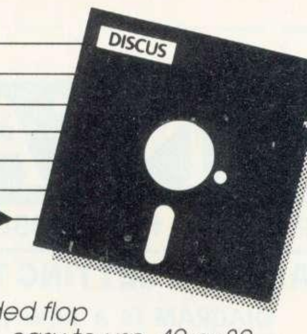


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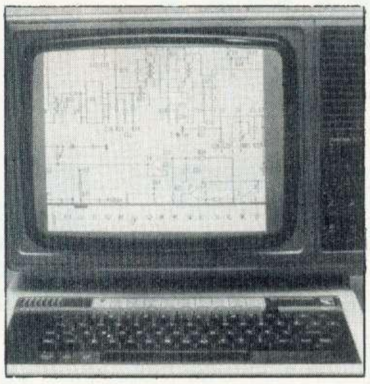
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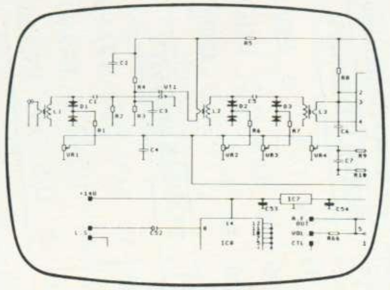
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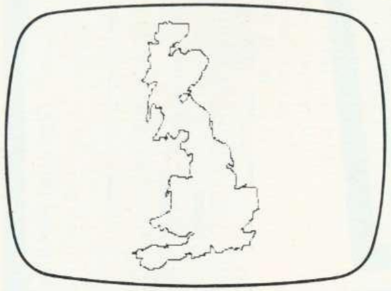
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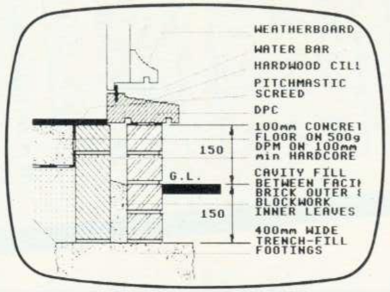
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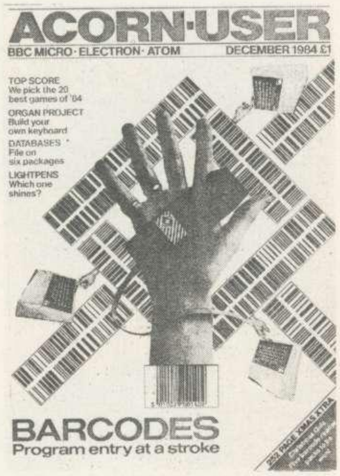
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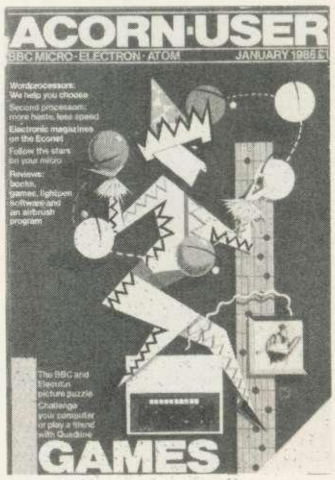
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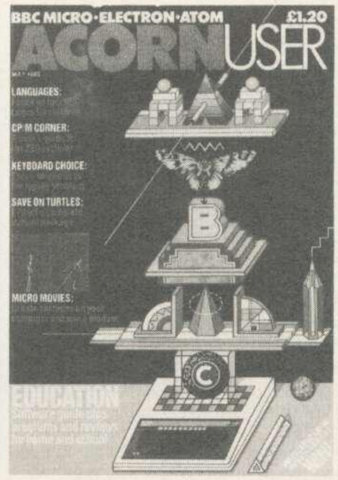
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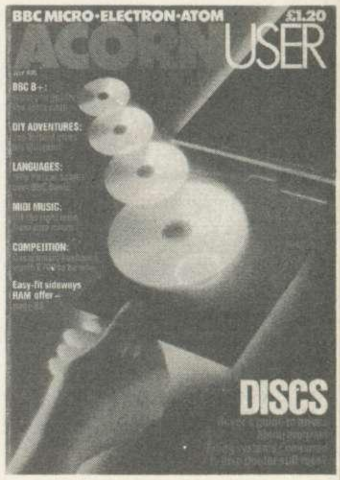
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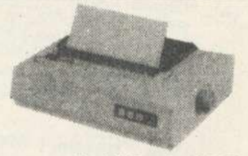
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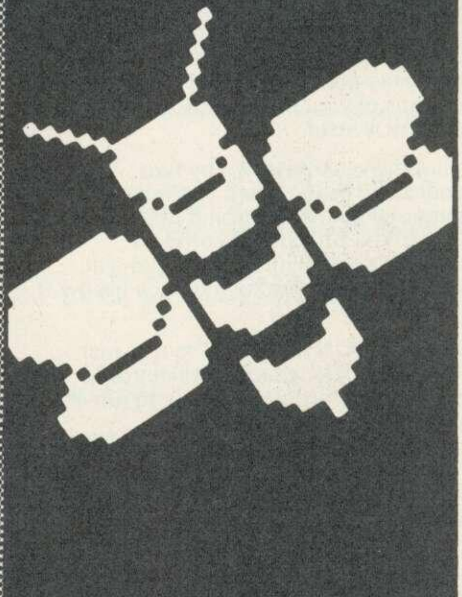
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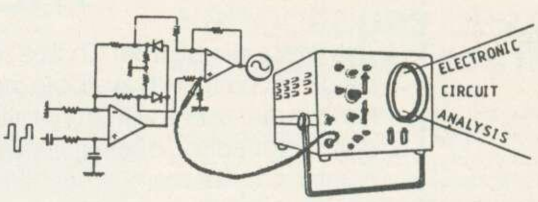
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REPLAY FACT FILE

REPLAY is a Hardware/ROM-based system, the unit can be easily installed without soldering, though if you have a ROM expansion board make sure that the REPLAY ROM can be fitted into one of the computer's own sideways ROM sockets.

With REPLAY installed games can be stopped and saved directly to disc at any time.

REPLAY can load back a stopped screen from disc ready for printing out with a suitable 'printer dump' routine.

Liven up your games with REPLAY: Different background colours: Infinite lives: Hyperspeed: Extra gears: Edit the improvements working from the data sheet supplied.

REPLAY can 'pause' games which do not have this facility built-in, and is also able to offer most disc to disc transfer.

The REPLAY System is intended to provide a facility for individual users, resulting discs are not recognised by a different computer.

Further details and copies of reviews can be supplied on request.

REPLAY is available for the BBC 'B' with O.S.1.20 and fitted with the following DFSs (State type when ordering).

R8271 Acorn and 8271 S/D. R8272 U.D.M. DFS
R8877 Cumana QFS. R2791 Opus 3.15
R2793 Opus 3.35 R1770C Opus Challenger 3.
R1770 Opus 3.45 and Solidisk (not latest 2.2 version).

Versions for the Acorn 1770 DFS, the BBC 'B+' and Solidisk 2.2 are in preparation, further versions will follow.

Available by post from:
VINE MICROS, MARSHBOROUGH, NR. SANDWICH, KENT.
Post Code: CT13 0PG. Telephone: 0304 812276.
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AA1F

USERDUMP

ACORN USER OFFER

A printer control ROM for £19.95



The wide variety of commands available on UserDump allow you to dump all sorts of screens without fuss

UserDUMP includes a ROM chip which plugs into any free ROM socket on your BBC micro, and an easy-to-use manual. With *UserDUMP* you'll have access to a wide range of commands to help you control your printer's facilities – all of this for just £19.95!

You will be able to dump any screen image in any display mode by entering a single command – either as a line of your program or typed in direct from the keyboard. *UserDUMP* will also give you a perfect dump while a machine code program is running.

UserDUMP will work with all the popular dot-matrix printers including: Epson MX, RX, FX, JX; Star Gemini, Delta, SG, SD, SR; Canon NLQ; Kaga NLQ: Mannesmann-Tally Spirit 80 and Lucas 80.

And also all printers with single and double-density bit-image graphics, including CP80 and JX80 colour printer.

UserDUMP provides all these extra commands:

***SDUMP**	dumps the whole screen in any mode
***WDUMP**	dumps the graphics window
***CDUMP**	very fast screen dump using the computer's character definitions
***ZDUMP**	special distortion-free dump of a mode 0 screen for selected printers
***TDUMP**	dumps the text window in any mode
***JDUMP**	colour dump for the JX80 printer
***WINDOW**	defines a graphics window from the keyboard
***C@**	sets up CTRL @ option
***TRANSTT**	converts a teletext screen into mode 1
***RTT**	restores a teletext screen after *TRANSTT
***LPRINT**	directs all PRINT commands to the printer only
***LPOFF**	cancels*LPRINT
***SET**	sets the printer text style
***RESET**	turns off the effect of *SET
***MAR**	sets either printer margin
***SHIFT**	shifts an area of memory
***CP80**	selects a CP80-type printer
***IBM**	selects an IBM-style printer
***EPSON**	cancels *CP80 or *IBM and selects Epson-style printer

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Send this form with your remittance to: **Acorn User Products, PHS Mailing Ltd, PO Box 14, Horley, Surrey RH6 8DW.** Please allow 28 days for delivery. HA3

USER GROUPS

LONDON

London. Association of London Computer Clubs: Robin Bradbeer, Polytechnic Of North London, Holloway, London N7 8DB
London. Association of Computer Clubs: Rupert Steele, 17 Lawrie Park Crescent, London SE26 6HH
London. Radio Amateur Micro User Group (G4KCS): The Secretary, c/o R. A. Webb, 39 Aldworth Road, Stratford, London E15 4DN
London. Wandsworth Computer Club: C. Verrier, Earlsfield Library, Magdalen Road, London SW11
East London. SOBAT Computer Club (East London): Mr T. A. Kayani, 12 Calderon Road, London E11 4EU
Tel: 01-556 5423
North London. BBC Micro Users Group: Mr Ric Keyworth, 'The Penthouse', 4b Kilburn High Road, London NW6 5UL
Tel: 01-734 9235
(7am-3pm Mon-Fri)
North London. 6502 North London User Group: Jim Chambers, Dept. of Psychology, University College, 26 Bedford Way, London WC1.
Tel: 01-387 7050 Ext 413
West London. Personal Computer Club. Contact Blue Tel: 01-579 5415. Chris Tel: 01-743 1579. Steve Tel: 01-540 6271

SOUTH-EAST

Aylesbury. BBC Micro User Group: Aston Clinton County Combined School, Twitchell Lane, Aston Clinton, Aylesbury, Bucks HP22 5JJ
Tel: 0296 630276
Bognor Regis. Bognor Computer Group (BUG): E. R. Piper, 2 Ely Gardens, Aldwick Park, Bognor Regis, Sussex PO21 3RY
Bottisham. BAUG: (Bottisham Acorn User Group), G. F. Wilcockson, 19 Gallows Hill, Saffron Walden, Essex CB11 4DA.
Tel: 23793
Bracknell. Bracknell Primary Schools Computer Users Group: D. Donaldson Secretary, Wildridings County Junior School, Netherton, Bracknell, Berks RG12 4DX
Brighton, Hove & District. Brighton, Hove & District Computer Club: J Smith, Secretary, 30 Leicester Villas, Hove, E. Sussex BN3 5SQ
Bucks. Chiltern BBC Micro User Group: Colin Mills, 70 Chestnut Lane, Amersham on the Hill, Bucks HP6 6EH.
Tel: Amersham 6103
Camberley. Camberley Computer Users Club: David Crosby-Clarke.
Tel: Crowthorne 771590,
Prestel mailbox 344771590
Carshalton. Acorn Atom User Club: Andy Nicholls, 4 Tavistock Road, Carshalton, Surrey SM5 1QR.
Tel: 01-644 9953
Caterham. Computer Club: Caterham Leisure Centre, Godstone Road, Caterham, Surrey CR3 6RE.
Tel: Caterham 48304/43316
Dartford. CP/M User Group: Diana Fordred, 72 Mill Road, Hawley, Dartford, Kent
Tel: 0322 22669
Guildford. West Surrey Computer Club: Jan Spencer, 52 Lindfield Gardens, Guildford, Surrey GU1 1TS. Tel: 0483 63512
Harpenden. Microcomputer Group: R. Welch, 7 Tylers, Harpenden, Herts AL5 5RT
Harpenden. International Adventure Club: Simon Martin Clarke, 10 Ennis Close, Harpenden, Herts AL5 1SS
Harrow. Harrow Computer Group: Bazyle Butcher, 16 St. Peter's Close, Bushey Heath, Watford WD2 3LG
Tel: 01-950 7068
Ilford. ILBUG: Peter Jones, 1 de Vere Gardens, Cranbrook, Ilford, Essex IG1 3EB.
Tel: 01-554 9825
Iver. Iver Computer Society (IC's): John Haigh, 11 Colliston Walk, Ford's Farm, Calcot, Reading, Berks RG3 5ZJ
Tel: 0734-417534
Kent. CP/M User Group: 72 Mill Road, Hawley, Dartford, Kent
Milton Keynes. BEEBACC: Brian Pain, 40a High Street, Stony Stratford, Milton Keynes.
Tel: (0908) 564271
North & Mid Essex. User Group (NAMEBUG): Andy Purkiss, 12 Palm Close, Witham, Essex.
Tel: 0376 515609
Prestel: 3765 15609
South East Essex. BBC User Group (SEEBUG): Miss J. Lines, 97 Oakhurst Drive, Wickford, Essex SS12 0NW
Tel: 03744 63396
Sutton. Sutton Library Computer Club: The Secretary, 21 Village Row, Sutton, Surrey SM2 6JZ
Welling. Computer Users Club: Tony Latham, 69 Hadlow Road, Welling, Kent DA16 1AX

SOUTH & SOUTH-WEST

Alton. Alton Computer & Electronics Society: Kevin Weatherhead, Sheen, Old Odiham Road, Alton, Hants GU34 4BW
Tel: Alton 87478
Bristol. Format 40/80 Club: BBC Disc User Group, Peter Hughes, 5 Marsh Street, Bristol BS1 4AA
Tel: 0272 799979
Fareham. Porchester & Fareham Computer Club: Simon Ward, 9a East Cams Close, Downend, Fareham, Hants PO16 8RP
Gosport. BOGBUG: Borough of Gosport BBC Users Group, Graham Dubber, 128 Wych Lane, Gosport, Hants PO13 0TE
Tel: (0329) 282221 (evenings)

MIDLANDS & ANGLIA

Boston. Boston Acorn Computer Users Club: J. C. Goodwin, 245 Church Green Road, Fishloft, Boston, Lincs PE21 0RP
Burton-on-Trent. Beeb Users' Group (Bug Club): Linda Yeomans, 13 Regent Street, Church Gresley, Burton-on-Trent, Staffs DE11 9PL
Derby. The Derby Microcomputer Society: F. Taylor, Secretary, c/o 5 Park View Close, Allestree, Derby DE3 2GH
Tel: Derby 559334
Huntingdon. RAF Personal Computer Association: Sqn Ldr J. A. Upham, Man S (ADP), HQ RAFSC, RAF Brampton, Huntingdon PE18 8QL
Norwich. Amateur Computer Club: Andy Leeder, Church Farm, Stratton St. Michael, Norwich NR15 2QB
Norwich. Norwich & District BBC Microcomputer User Group: Roy Street, Church Farmhouse, Themelthorpe, Dareham, Norfolk NR20 5PS
Tel: Foulsham 579
Nottingham. BBC Micro User Group: John Day, 8 Warkton Close, Chilwell, Notts NG9 5FR.
Tel: 0602 225660
Prestel: 602 225 660
Redditch. Redditch Computer Club: Anthony Green, 14 Radway Close, Redditch, Worcs B98 8RZ
Tel: 0527 61434
Stoke. POTBUG BBC User Group: J. Forest, 50 Cliff Street, Smallthorne, Stoke-on-Trent, Staffs
Tel: 818430
Stratford. Stratford Computer Club: Chris Parry, Secretary, 15 Kipling Road, Stratford-on-Avon
Tel: 0789 68080
Suffolk. West Suffolk BBC Micro Users' Club: Antony Hurden, 14 Plovers Way, Bury St, Edmunds, Suffolk IP33 2NJ

NORTH-WEST

Cheshire. Mid-Cheshire Computer Club: Michael Christie, 496 The High Street, Winsford, Cheshire
Cumbria. West Cumbria User Group: P. Majid, Tel: 0946 62732 or
K. Purkiss, Tel: 0946 66586
Mersey. Mersey BBC User Group: Nik Kelly, 56 Queen's Drive, Liverpool L4 6SH
Preston. Preston BBC User Group: Duncan Coulter, 8 Briar Grove, Ingol, Preston PR2 3UR

NORTH-EAST

Huddersfield. Huddersfield BBC Micro User Group: Stuart Mallinson, 34 Ryefields, Scholes, Huddersfield, West Yorkshire HD7 1XF
Hull. Forum 80: 421 Endike Lane, Hull HU6 8AG
Hull. MUSE (for teachers): PO Box 43, 231/2 Friary Chambers, Whitefriargate, Hull HU1 2HD.
Tel: 0482 20268
Hull. TRS-80/Beeb Users Group: R. V. Souter, Secretary, 4 Risby Garth, Skidby, Cottingham, Hull HU16 5UE. Tel: 0482 845326
Keighley. Keighley Computer Club: Colin Price, 'Apple Garth', The Hob Hill, Steeton, Keighley, W Yorks.
Tel: 0535 54738
Newcastle. Newcastle & Washington BBC User Group (NEWBUG): Jeff Cranmer, c/o Washington Town Centre Library, The Galleries, Washington, Tyne & Wear.
Tel: Houghton (927) 849342 after 6pm
Sheffield. ABUG: John Fryer, Treasurer, 17 Edgedale Road, Sheffield S7 2BQ
Sheffield. Parsons Cross BBC User Group: Andrew Grant, 28 Rokeby Road, Sheffield S5 9FU.
Tel: 0742 461203
S Yorks. South Yorks Personal Computer Group (SYPCG): Bob Hindle, 139 Penrhyn Road, Sheffield S11 8UP
Wakefield. Wakefield BBC Micro User Group: The Secretary, 116 Pinderfields Road, Wakefield, West Yorkshire WF1 3PL

SCOTLAND

Central Scotland. BBC User Group: D. Davidson, 1 Roxburgh Place, Larbert, Stirlingshire FK5 4UE
Inverclyde. Inverclyde BBC Micro Users' Club: Robert Watt, 9 St John's Road, Gourock, Renfrewshire PA19 1PL.
Tel: Gourock 39967

WALES

Cardiff. Cardiff BBC Computer Club: Geoffrey Barker, 2 Whitcliffe Drive, Penarth CF6 2RY.
Tel: 0222 701023

N. IRELAND

Belfast. Belfast Computer Club: Andrew White, 19 Greenpark Drive, Markethill, Co. Armagh, N. Ireland BT60 1PX

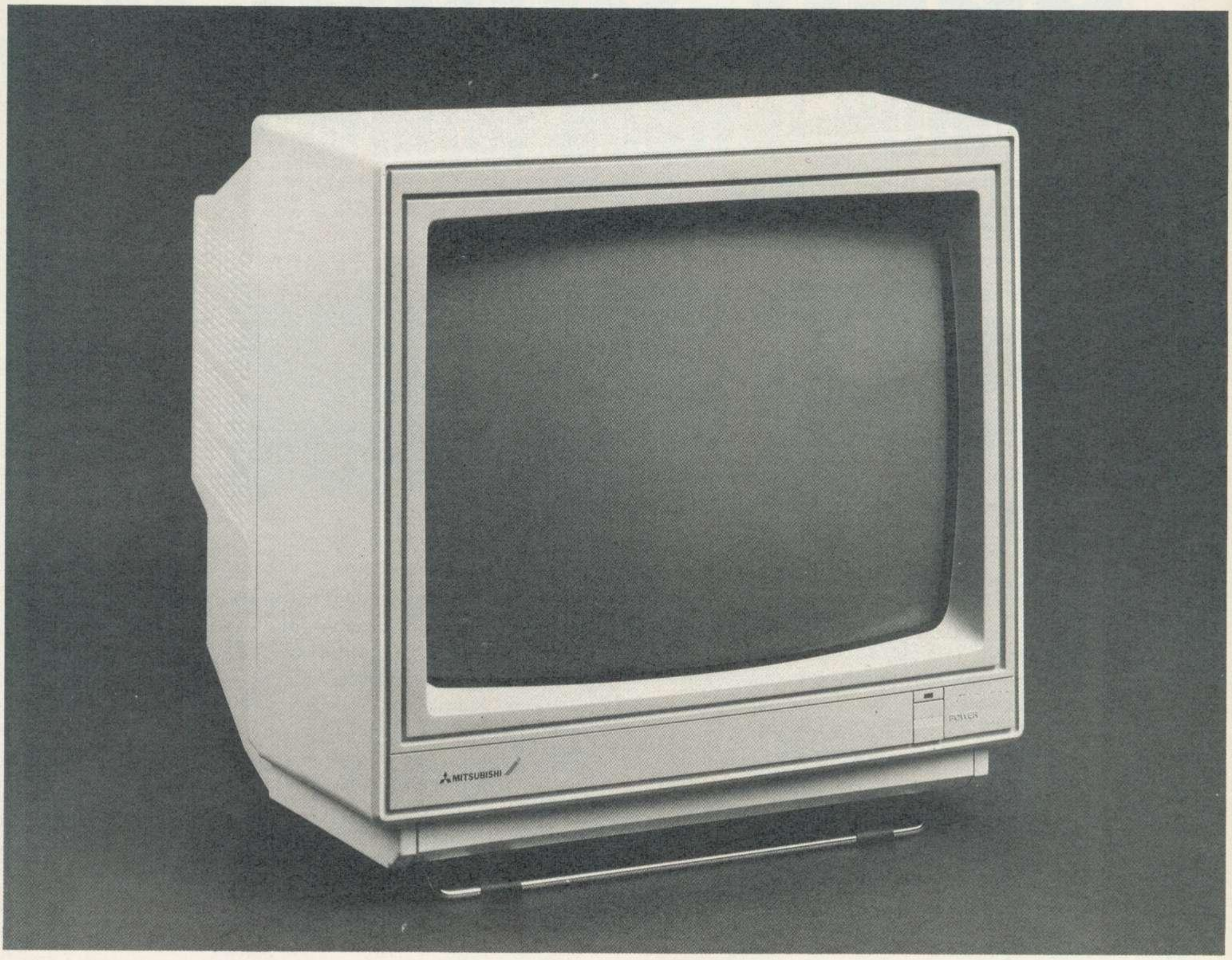
OVERSEAS

Australia. BBC Users Group of Canberra: Steve MacLeod, 5 Hatfield Street, Evatt A. C. T. 2617, Australia
Tel: (062) 587719
Australia. Beebnet: M. A. Cowley, President, PO Box 262, Kingswood, South Australia 5062
Australia. Ozbeeb Sydney, meetings North Ryde. PO Box 1030, Parramatta 2150.
Tel: day 635 4868, eve 868 4455
Canada. Atom Users' Group of Canada: John Wood, 812 Cabot Trail, Milton, Ontario L9T 3M8, Canada
Canary Islands (Spain). BBC Micro Club Tenerife: PO Box 560, 38000 Santa Cruz de Tenerife, Canary Islands (Spain)
Eire. Irish Amateur Computer Club: Austin Vaughan, 35 Monastery Drive, Clondalkin, Dublin 22, Eire. Tel: (01) 593112 (evenings)
Eire. OIFIG (Official Irish Forth Interest Group): c/o Hugh Dobbs, Newton School, Waterford, Eire
Finland. Arjen Raateland, Hopeatie 10A21, 00440 Helsinki 44, Finland
Tel: 90-5625027
France. Club Informatique Assevent: X, Durieux, 7 rue des Warimetz, 59600 Assevent, France
Greece. Microclub: C. Mantzavinatos, 17 Stournara Str, 106 82 Athens, Greece
Tel: 01 3640.675-6
Malaysia. Sabah Computer User Group: c/o Albert Vun. PO Box 69, Kota Vun, Sabah, Malaysia
Malta. BBC Micro Users Club (Malbeeb): Ray Zammit, 'San Jose', Old Railway Road, Balzan, Malta
Netherlands. Big Ben Club: J. Assies, Secretary, PO Box 177, 4670 AD Zevenbergen, The Netherlands
Norway. BBC INFO: Horten Ingenlorhogskole, Skippergt. 6, 3190 Horten, Norway
Norway. Skandinavien BBC User Group: Frans-Otto Hendriks, Ludvig Karstensvei 14, 1064 Oslo 10, Norway
Pakistan. BBC Users Group. Capt. Z. A. Kidvai. Tel: Karachi 540986
South Africa. Acorn Atom Users Group: J. G. Dowling, 27 Oribi Avenue, Van Riebeeck Park, Kempton Park 1620, South Africa
South Africa. Pretoria BBC Users Group: Stan Miller, PO Box 117, Montana 0151, South Africa
Sweden. BBC User Group (BUG): Anders Wickman, Folkungagatan 58, 116 22 Stockholm, Sweden
Tasmania. Tasbeeb (BBC Users' Group): Box 25 PO, North Hobart 7002, Tasmania, Australia.
Tel: (002) 342704

SPECIAL INTEREST

Accounts. BEEBACC: Brian Pain, 40a High Street, Stony Stratford, Milton Keynes.
Tel: (0908) 564271
Adventure. International Adventure Club: Simon Martin Clarke, 10 Ennis Close, Harpenden, Herts AL5 1SS
Atom. Acorn Atom User Club: Andy Nicholls, 4 Tavistock Road, Carshalton, Surrey SM5 1QR.
Tel: 01-644 9953
BLUG. British Logo Uses Group: Richard Olney, c/o London Technology Network, 86-100 St Pancras Way, London WC1
Bulletin Boards. Forum 80: 421 Endike Lane, Hull HU6 8AG
CP/M. CP/M User Group: Diana Fordred, 72 Mill Road, Hawley, Dartford, Kent.
Tel: 0322 22669
Disc Users. Format40/80 Club: Peter Hughes, BBC Disc User Group, 5 Marsh Street, Bristol BS1 4AA
Electronics. Alton Computer & Electronics Society: Kevin Weatherhead, Sheen, Old Odiham Road, Alton Hants GU34 4BW
Tel: Alton 87478
Forth. OIFIG: (Official Irish Interest Forth Group), c/o Hugh Dobbs, Newtown School, Waterford, Eire
Heraldry Society. Colin Forrester, 5 Hook Road, Epsom, Surrey KT19 8TH
Photography. Computer Aided Slide Photography. Paul Rogers, 39 Moorfield Road, Dentons Green, St Helens, Merseyside WA10 6AX.
Tel: 0744 28532
Primary. Bracknell Primary Schools Computer Users' Group: D. Donaldson, Secretary, Wildridings County Junior School, Netherton, Bracknell, Berks RG12 4DX
Radio. Radio Amateur Micro User Group (G4KCS): The Secretary, c/o R. A. Webb, 39 Aldworth Road, Stratford, London E15 4DN
Teachers. MUSE. (for teachers): PO BOx 43, 231/2 Friary Chambers, Whitefriargate, Hull HU1 2HD. Tel: 0482 20268
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BBC computer model B 1.2OS, Acorn DFS, Cumana 100k disc drive, cassette recorder, loads of software, books, etc, joystick, £300. Tel: 061-440 8758 after 4pm.

6502 second processor for sale. Virtually unused. Complete with ROMs and manual, £150 ono. Tel: 0384 891073 (West Midlands).

BBC B 1.2OS (little used) Acorn DFS, Wordwise Plus. All leads + 150 programs on 80 track discs. Cost £900+, going for £395 ono. Watfords DFS ROM + manual + many utilities on disc for £25. Cumana 400 CX disc drive + discs + programs, £195 ono. Tahir, 24 Irving Place, Blackburn BB2 6LR.

ELECTRON computer little-used, £70. Unused Plus One, £40. Omega compatible cassette machine, £15. Unused BBC *Wordmover* cassette package, £10. Please phone 01-821 7434 weekdays before 8am and evenings or anytime weekends.

FOR SALE. Acorn Z80 second processor including all original software and manuals, £250. As new. Tel: 0386 49421.

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PRINTER £20 R.S. components miniature dot matrix system including controller, PCB, and all components (cost £70). Tel: Glos. 417613 evenings.

MODEM 84. Contact other computer users. Swap programs and information. This modem comes with Watford electronics ROM software. Only £39 for both. Tel: Chris on 04946 2303.

ACORN Electron, 6 months old, books, magazines, Quickshot II, joystick and interface plus lots of games. Cost over £230 new. Will consider any offers. Tel: 01-202 8332 on evenings or weekends.

WORDWISE ROM and manual £17. Tel: Camberley 64118. 41 Station Road, Frimley, Surrey.

ELECTRON Plus-3 ADFS with disc drive. As new, £189. Phone: 01-554 6555 (Ilford, Essex).

SPECTRUM 48k good condition, still boxed, Currah N-speech, Amstrad cassette recorder and lot of software, only for £95 ono. Contact Faiz PG/PH/MOLS, Univ of Sussex, Brighton BN1 9QJ.

BBC B OS1.2, leads, magazines, software extensive, 18 months old, £250. Monochrome monitor £30. Data recorder £15. Monitor is 6 months old. Phone Moray 01-670 4049. Deliver in South London area, tel: evenings.

DISC drive Teac FD55E 200k 80-track single sided, cased with power supply and leads, £90. Write Mr S. Wadey, 17 Brightland Road, Eastbourne, E. Sussex BN20 8BG.

BBC B (OS.1.2) Basic 2 with Opus DDOS (1.45OS) 5401 disc drive friction/tractor feed, dot matrix printer (Epson compatable). Lots of magazines and three discs with utilities, £700 ono. Will split. 01-669 0622.

SPEECH synthesiser from Watford Electronics. Complete with vocabulary ROM and user guide. Speaks any English word. No soldering. Plug in and go. As new, £20. Telephone Darren, Dereham (0362) 3123, evenings.

BBC books: 'Handbook Of Procedures And Functions', 'Advanced Machine Code Techniques', 'Pascal From Basic'. Cost £22.50, sell the lot for £10. All vgc. Tel: 01-689 8372 (Thornton Heath).

CONTACT wanted to swap ideas and information on BBC micro. Write to Stuart Back, 17 Allenby Street, Mowbray Heights, Launceston, Tasminia, Australia, 7248. All letters answered!!!! Hope to hear from you soon.

PRINTER Microline 80 5, 10, 16.5 CPI, fanfold, paper roll, or single sheet paper feeds £160 ono. Would consider swap for Mouse, monitor, modem, 2nd processor etc. Cash adjustment. (Banstead) 07373 52038.

LVL DOUBLE-DENSITY disc interface. Also STL SWR32k sideways RAM unit for sale. Any offers? Phone (0625) 24571 evenings.

ACORN Electron, with Plus One interface, joystick, 14 tapes including Elite, magazines, book and dust cover, £190 ono. Chesham (0494) 784540 after 6pm.

BBC fan interested in exchange of software and ideas with other BBC owners from Europe. Has twin 800k discs, SWR and 6502 second processor. Write to: Dejan Ristanovic, Gvozdićeva 34, Belgrade, Yugoslavia.

8INCH floppy discs in library cases. 10 DS/DD £15. 1 DS/SD hard sectored (has two index holes) £10, unwanted/unsuitable gift. Phone (0782) 550684 please.

ACORN Electron with Plus One interface and joystick, over £130 of software including Elite, Repton, Zalaga and Starship command cartridge. Everything working and boxed. £200 ono. Phone Simon (0302) 844842 after 6.00pm.

WANTED: Acorn Atom, books, Addons software, even not working, anything for Atom considered. Tel: Leicester (0533) 402343.

ACORN Z80 second processor, ideal for small business. CP/M 2.2, Cobol and business software only £225 (or £500 with BBC computer). Tel: 0705 464005 after 6pm, ask for Neil.

NEW ZEALAND. BBC B computer user would like to correspond, swap ideas, magazines, etc., with BBC B user in UK, America or other country. Write to Daniel Armstrong, 77 Cambridge Street, Ashburton, New Zealand.

SOLIDISK sideways RAM SWR 16. Comprising hardware, manual, Solidisk software & miscellaneous software. Perfect condition. Cost £43, Price £30, including post. D. R. Boyd, Treuddyn Mill, Treuddyn, Mold, Clwyd, CH7 4BD.

DFS Acorn disc interface, unused, £55. SSSD disc drive 4OT, leads, manual, utilities disc £55, both £100. Computer utilities Disc Doctor ROM, £20. Tel: 074488 4040.

ACORN Electron + Data recorder, £100 software, Chess, Pacman, Galaxians, Boxer, Frogger and leads, manuals, only 4 months old, under guarantee, will include colour monitor, only £140. Plymouth 58124. Phil Shotham Place, Stoke, Plymouth.

HALF PRICE Memotech 512. FDX single disc drive. Software cost over £1100. Books, full 64k usable memory, will accept £550. Can demonstrate. Tel: Barry Stretham (035 389) 463 evenings.

BBC B (O.S.1.2), 200k double-sided dual drives, Hi-res colour monitor, Epson MX-100 III printer, 500+ pieces of software, WS2000 modem, HCR Eprom programmer, blank Eproms, various ROMs, tape recorder, £1250. Telephone (0438) 68624.

EXCHANGE Falcon super tourist 24" cycle, new, list price £170, used four times, wanted Cannon 221A super slim disc drive or WHY for BBC O.S.1.2. Tel: 0284 66797 (Tom).

WANTED: Working BBC B with no extras and no fancy prices. Modified A, OK. Tel: 0905 356673 (Worcester).

ATOM 33k, 16k Timedata RAM board, ROM board, screen ROM, Disatom, speech board, Acorn disc pack, 5 amp PSU, monitor, manuals, leads and software, will split. Highest offer. Tel: 0232 38546.

WANTED: Acorn Atom DFS with fitting and operations manual. Disc drive not needed. Send details to: N. Halse, 6 Follett Close, Old Windsor, Windsor, Berkshire, SL4 2NZ.

HELP could someone loan me information on Toolkit. It was in my BBC micro when purchased second hand and in no hand book was included in the sale. Phone Fleet 02514 22040.

BBC disc interface, Cumana 100k drive, Seikosha printer, joysticks, Solidisk 32k RAM, books, masses of software and ROMs, discs, external speaker, disc box, will sell, everything, £800. Phone Andrew on 01-959 1916 or 01-906 3572.

SPECTRUM 48k interface 1. Two microdrives. DK'tronics keyboard. Centronics printer interface. Pascal Devpac Tasword II + others. Books and cartridges also available, £220 ono. Weybirdge 40910.

AUSTRALIAN BBC B owner looking for contacts. Interested in exchanging tips on adventures. I have 40/80 disc drive. Are there Astroids in Elite? R. Russell care of 46 Fairmont Avenue, Camberwell, Victoria, Australia 3124.

Acorn User has been alerted to the abuse of the free ad service and, regrettably, can no longer accept entries selling or swapping software.

WANTED: Highly intelligent BBC B user as correspondant. I am quite intelligent and wish to learn as much as possible. 'Hackers' or programmers. Please contact Andy Whitney, 20 Lancaster Road, Rayleigh, Essex SS6 8UP.

WANTED: Acorn Electron user to swap ideas, magazines, tips and hints etc., will write to everyone that replies. Write to Chris Dymock, 16 Manse Close, Exhall, Coventry, CV7 9NT.

ACORN DFS upgrade kit. Cost £115 new, sell for £80 ono. Telephone Bernie home (0273) 557995, work (0273) 606755 extn. 236.

QUICK SALE: Over 110 mags (all MUs most AUs + others), + over £300 orig. software (from Forth C.Quest) worth £450+, only £225 ono. Phone: 01-299 1980, after 6pm ask for Stephen, buyer collects.

PENFRIEND wanted to swap ideas and games. Write to: Philip Chow, 18 Dragon Drive, Whiston, Merseyside, Liverpool L35 3QW, Or phone 051-426 2091 after 4.30pm or 6-10pm at weekends.

SEIKOSHA GP 100A printer, perfect condition with BBC to printer lead, manual and AU Seikosha help sheets. £85 inclusive. Phone Richard Linter 0458-42122 after 5pm.

MODEMS both ex Telecom with BBC lead. 300/300, £20, 1200/75 £30. Tel: 0909 564309 evenings.

BBC B, Solidisk DDFS, 16k sideways, LVL DDFS, dual DSDD drives, speach recognition, modem, printer, cassette 12" b/w monitor/TV, 6" green monitor, 32k ZX81. £750 the lot. Phone Downland 52915 (Croydon, Surrey).

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FOR SALE: Computer Concepts Graphics extension ROM £18. Acorn DFS0.90 £13. Solidisk 16k SCUR unit £27. Telephone 0423 883493 (Harrogate) evenings only.

We've changed the format of the Free Ads so that we can clear the backlog and no longer have to carry ads over from one issue to the next. The Free Ads are carried in the magazine as space permits, so please allow about two months for yours to appear.

FREE PERSONAL AD SERVICE

Sell your old hardware or pass on information. Fill in the form below to a maximum of 32 words (one in each box) and send it to Acorn User Free Ads, 68 Long Acre, London WC2E 9JH. Please use capital letters, write clearly, and remember your name, address or telephone number. Without this full information, supplied on a separate sheet of paper, we regret that we cannot carry your Free Ad. This is a service to readers – no companies please. One entry per form only, and we cannot guarantee any issue.

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■ **Exam preparation:** 200+ question data banks: computers, chemistry, physics. BBC discs £13.50 each. Special Econet versions £27.50 each. BBS, 4 Chaomans, Letchworth, Herts SG6 3UB.

■ **Problems?** R-SOFT utilities can help you! **1. How-to:** An essential collection of software and instructions for frustrated new disc owners who want to move their programs to disc. **2. Nutcrackers:** tape2tape + tape2disc + disc2disc + disc2tape. **3. Rompull** and **Tapedump. 4. Automatic Disc Menu:** Includes a sideways RAM version, can boot from ROM, works with 2nd 6502. **5. Autosol:** Will automatically boot your Solidisk with a preselected list of ROMs. **6. SWROM*:** puts your Basic/machine code programs in ROM format. **7. RFS-Generator:** Generates ROMs for the *ROM filing system. This does not use DFS workspace and is an ideal tool to run nasty programs from disc. All above packages £5 each; **How To + Nutcrackers:** £9. **D-Master:** Superb disc copier (is unprotected): £7. Many other utilities: Send for our list (SAE please). R-SOFT, 22 Marriotts Close, Felmersham, Bedford MK43 7HD. Tel: (0234) 781730.

■ **Hackers Phone Book** Telephone numbers and guide to bulletin boards, mainframes, listed and unlisted worldwide, £6.75. B L Sothcott, 56 Waterloo Road, Freemantle, Southampton.

■ **Titan.** A superlative game aid program for fantasy role-playing addicts. Titan creates characters for players of AD&D. Fast, detailed and comprehensive. Save characters to disc or printer. Full details or orders available from: Goldsoft, 42 Hallmores, Broxbourne, Herts. Cheques for £13.95 (80T) and £12.50 (40T) to Ducalplex Ltd.

■ **To Hire** a BBC and peripherals ring 01-607 0157 or 01-997 6457. Computer Hire Services, 294a Caledonian Road, London N1 1BA.

■ **Sideways RAM** printer buffer for BBC B/B+. On 40/80 disc with other useful utilities. £19.50. Send SAE for details: CCD, Winslade Barton, Clyst-St-Mary, Exeter EX5 1AT.

■ **Plus 3 Bank Account** £8. Tape version for Electron or BBC £4. SAE for description and sample. P Lake, 29 Dewhurst Road, Cheshunt, Herts EN8 9PG.

■ **RAM filing system** on ROM – just £10! Best possible use for sideways RAM! SAE for full details. S Hotchkiss, Mason Hall, The Vale, Birmingham B15 2RL.

■ **Notice** – Simonsoft Sprites version two package, features sprite animation routines, still available at £8.95. Superfruit £5.95. Simonsoft, 25 Tatham Road, Abingdon, Oxon OX14 1QB.

■ **Educational discs/tapes.** O-level Biology; Spelling; Physical Geography; Chemistry. Econet. Discs £12.95, cass £8.95. School Software, 69 Meadowvale, Raheen, Limerick, Ireland. 353-61 27994.

■ **Listing Service** for BBC and Electron users: from 3p/block. Also screendumps *Wordwise*, *View*, barcodes. Screendumps from 6p/screen. SAE or phone: Scorpiosoft, 18 Dragon Drive, Liverpool L35 3QW. Tel: 051-426 2091.

■ **Command Line Editor** replaces BBC Copy Editor: backspace, delete within line, insert, last line recall. 40/80 track. £5 cheque/PO: J Smith, 1 The Gardens, Stotfold, Hitchin, Herts.

■ **BBC B 1.2OS** + 100k disc drive, Toolkit and Disassembler ROMs, £260 software, Acorn speech synthesiser, advanced manual, 50 magazines and 4 books. £650 ovno. M E Warren, 39 Redstone Hill, Redhill, Surrey. Tel: (0737) 64763.

■ **BBC B 1.2OS,** DNFS, 100k Acorn drive, Phillips green screen, speech interface, *Wordwise*, Graphics ROM, AMX Mouse, data recorder, Quickshot joystick + adapter. £600 of software on tape and disc, disc box, lots of magazines and books. cost £1500, a bargain at £750. Telephone: 01-736 5241.

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■ **Disable Break** +CTRL. A 40T disc will disable Break+CTRL for any Basic program. 100% M/C. More utilities. £5.99 inc. S Kerbeck, 76 Tunsall Road, Addiscombe, Croydon, Surrey CR0 6TW.

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■ **Wordprocessors** for sale. *Scribe*, *View* 2.1 and *Hi-View*. All £20 each. All mint condition. Telephone (evenings) Charles Harvey on (0299) 266188 or write to April Cottage, Callow Hill, Rock, Worcs DY14 9XL.

■ **Triple** contains Twin to back-up valuable protected discs, Digger to display format information and contents of all readable tracks (and alter it if desired), and Dual to create your own 40/80 track discs. £10. Twin alone, £7. John Connett, Dene Croft, Westcott Street, Westcott, Dorking, Surrey RH4 3NY.

■ **Teltext.** A superb screen-based database for BBC with disc drive. Designed in the classroom, it is ideal for use at home, in the office or at school. Available from: Goldsoft, 42 Hallmores, Broxbourne, Herts. Tel: 467957/445886. Cheques/POs for £14.95 (80T) and £13.50 (40T) payable to Ducalplex Ltd.

■ **Maths Marvels** graphic demonstrations at *Scientific American* level. State 40 or 80 track disc. Not for Electron. £6 cheque/PO to D McQuillan, 12 Keldholme, Bracknell, Berks RG12 4RP.

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■ **BBC B+ 128k £425.** Juki 8100 £319. Epson FX80+ £319. Cumana double drives 200k £175. 800k 40/80 £255. DS/DD discs £9.50 for 10. Electron dust covers £3.25. French, German, Italian, Spanish language programs, BBC/Electron £7.95. All items new and prices inclusive. TBS, 29 Hollow Way Lane, Amersham, Bucks HP6 6DJ. Tel: (02403) 21702.

■ **Super-Spooler.** The ultimate in machine code utilities, converts raw machine code back into an assembly language program. Requires BBC B fitted with 16k sideways RAM expansion. Cassette + user guide £11.50 or send SAE for a full spec sheet to: Mr R Robinson, 4 Stonehill, Castle Donnington, Derby DE7 2LY.

■ **NLQ for Epson** compatibles with DOTPRINT-PLUS, the more versatile NLQ ROM. Variable pitch (including 12 chrs/inch) and line-spacing (n/72"), true bold print plus proportional, enlarged and underlined text. Microspace justification (no long gaps between words) and standard or user-designed fonts. £18.50 from P Sedgwick, KNOWWARE, 79 Nottingham Rd, London E10 6EP.

■ **School Software Ltd:** Econet discs for £12.95, cassettes £8.95. Offer lasts one month only. Chemistry (12-16), Biology (12-16), Physical Geography (12-18), Better spelling (10-14). Viewing at MEP Centres. Send cheque to 69 Meadowvale, Raheen, Limerick, Ireland (353-61 27994).

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Please include your cheque for £11.50 (inc. VAT) made payable to Redwood Publishing. This is the standard fee. Don't forget your name, address or phone number. Send cheque plus form to Acorn User Small Ads, 68 Long Acre, London WC2E 9JH. Please print clearly.

ACORN USER'S

DIARY

Acornsoft boss storms out in row

A sensational row in the Acorn Cabinet ended with David Johnson-Davis, head of Acornsoft, storming out after calling one of his fellow directors 'a snivelling little git'.

A power battle over the future of Acornsoft as a separate company has been waged for months between DJD and the mandarins of the Olivetti civil servants.

But the faceless mandarins appear to have won with DJD finally deciding he could not stay on under the new regime.

DJD, who is reported to have slammed the door on his way out and left another one open, is the second director to go within a year. The first, *Hill Street Blues* fan Peter O'Keefe, walked out after attempting to bite the then chairman Alex Reid on the ankles.

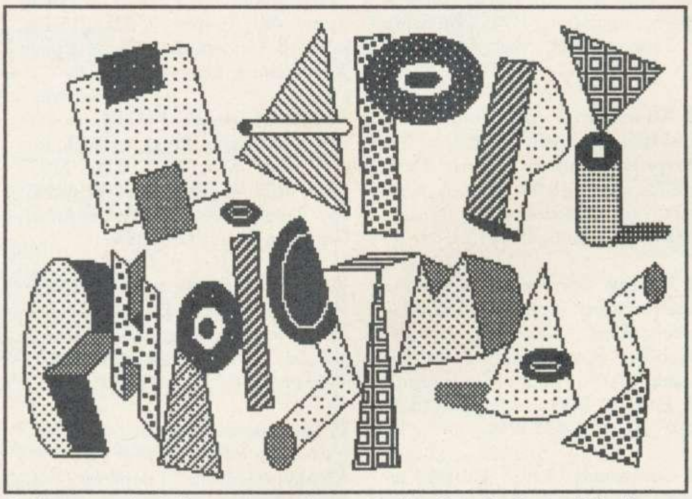
Members of the Acorn Cabinet have refused to discuss the latest drama. However, we have been able to piece together what happened from witnesses who heard the drama in nearby Huntingdon.

Initial discussions centred on what to do about the recent brain drain from the business division to start up a zoo.

Then the Olivetti teddy boys put forward their proposals to close Acornsoft altogether. There followed several minutes of loud exchanges with Iron Man Brian Long attempting to keep order.

The participants took a five-minute break for tea, and then hostilities resumed.

But they didn't last long. Within a minute, everyone had stopped talking Italian and lapsed into their native language. Then, with his famous cry echoing around the Cherry Hinton board room, DJD was gone.



Christmas card of the year award goes to Jonathan Inglis for this Mouse-produced offering. But he excelled himself inside with the legend: 'Tony, *Brian* . . . etc'. Now all we need to do is employ a Brian

Magazine madness

Magazine awards time again, and boy have we got a bumper crop this month. Comparing the output of the various organs is good for the soul, not to mention the humour glands.

First of all there was the coverage of the weeklies. *Popular Computing Weekly* was the runner up for getting the launch of the Master in, but getting it all wrong. However, the winner in this group was *Microscope* for not getting it at all!

Even the monthly *Micro Re-User* beat *Microscope*, this time by re-using Acorn's press hand-outs and calling it the best thing since sliced bread, without even having a clue how much it cost!

However, this ineptitude must play second fiddle to *A & B Computing* for the news story in its February mis-issue. We reproduce this in full below to do it justice.

Model C for Which Micro Show?

Pure speculation but how about a Model C based on the Communicator technology? Perhaps a launch at the Which Micro? show in Birmingham (14th to 17th January). Don't quote us!

Perhaps A&B Computing should polish its crystal ball?

A Master leap

Acorn took its jump into the micro market with the Master – the machine with the hump – at a four-day launch at the BBC's Langham Gallery opposite Broadcasting House in London. Something like 1000 people were invited including journalists, teachers, dealers and software houses.

At two sessions each day the big boss Brian Long did impressions of Leslie Crowther fronting *Come on Down* to introduce a variety of people 'doing their thing' on BBC micros.

Among the variety were Jonathan 'Brian' Inglis doing an 'all our yesterdays' of art on the Beeb.

Then there was David Atherton of BBC Publications – the VATman who had spent all his life robbin' people and turned over a new leaf to become a software manager for products needing constant monitoring.

Even teddy bears were represented, with one helping preview a video disc on the BBC's Domesday Project demonstration.

The man from Digital Research showed off Gem on the Master (in monochrome), although he was given the runaround by people trying to crash it by filling circles drawn with dotted lines.

And then we all trotted off home clutching glass goblets emblazoned with the Master logo.

Going to the zoo

The success of Martin Grantham in saving the local zoo has prompted several members of Acorn's business division to set up on their own a place where Acorn employees can go on a rainy day.

The venture is believed to be located at a disused railway station, which has good communications. It is unclear how many staff there are so far, but they already have a ram installed.

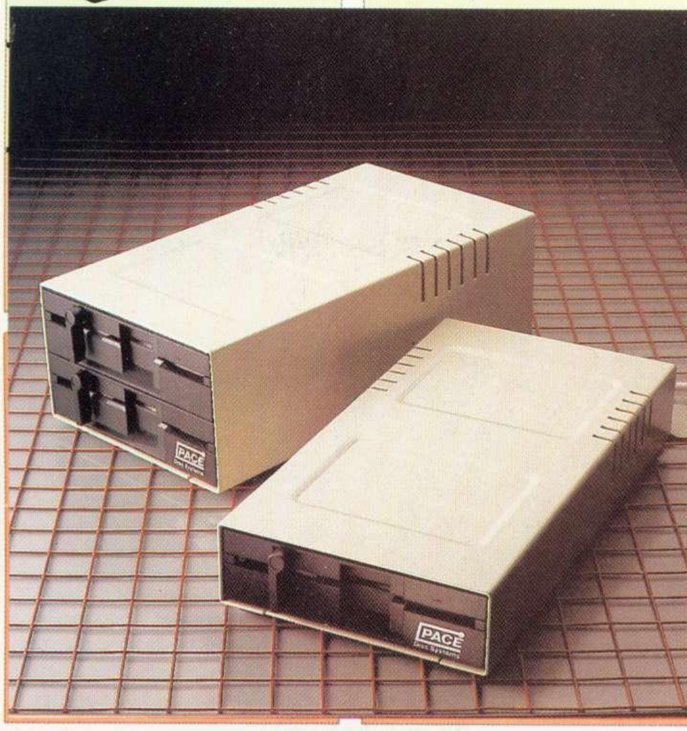
'We'll have to see where it all leads, but gee have we been getting the banner headlines in the local paper,' someone said.

Acorn's engagement

Latest ploy by the ever-engaged switchboard at Acorn's Newmarket Road offices: after you finally get through (on about the fifteenth call), the answerer engagingly says 'It's a very bad line, could you call back?' Idiot that you are, you do. Guess what? It's engaged!

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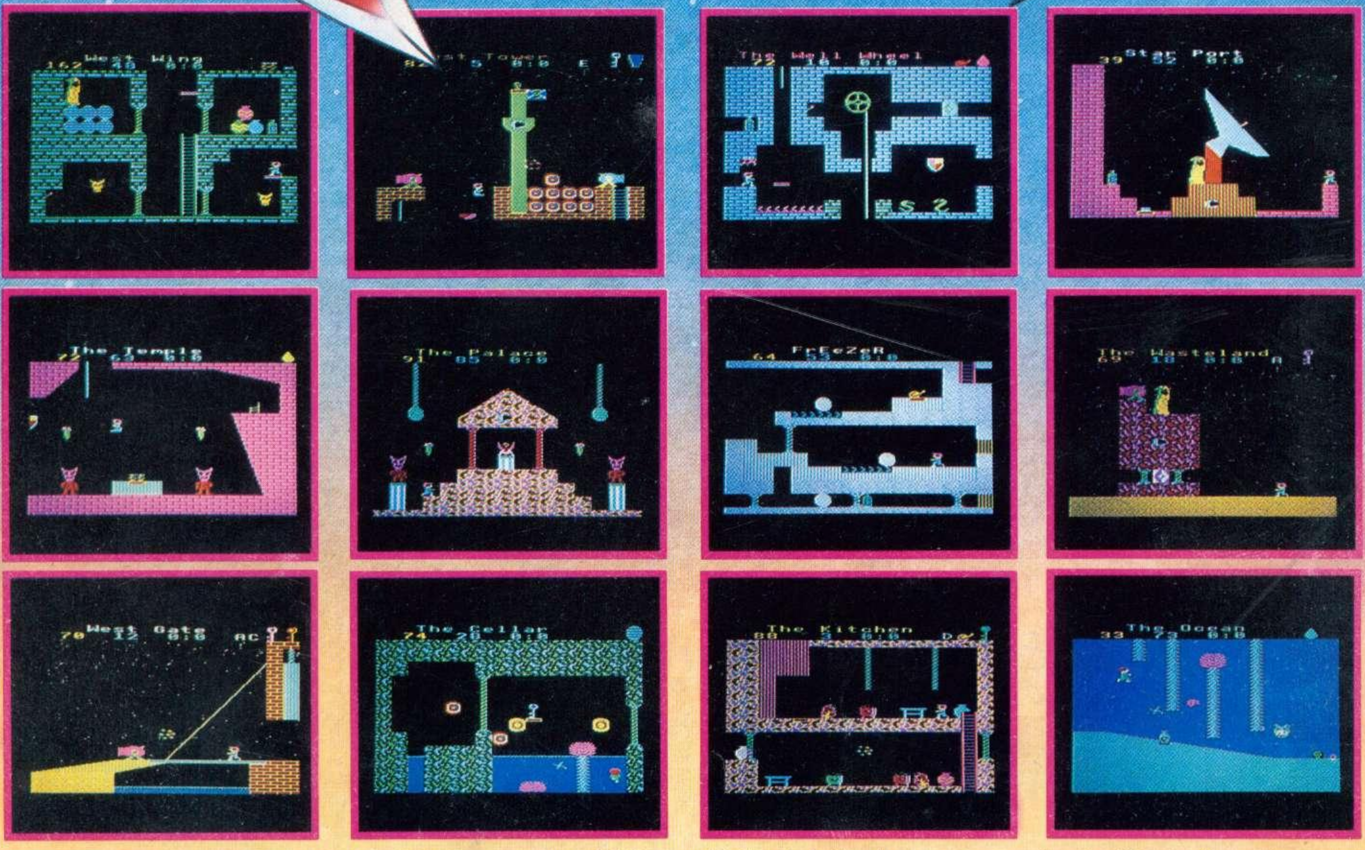
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